tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Manual Description

Manual Description

This technical manual is written for an experienced technician and contains sections that are specifically for this product. It is a part of a total product support program.

The manual is organized so that all the information on a particular system is kept together. The order of grouping is as follows:

- Table of Contents
- Specifications and Information
- Identification Numbers
- Tools and Materials
- Component Location
- Schematics and Harnesses
- Theory of Operation
- Operation and Diagnostics
- Diagnostics
- Tests and Adjustments
- Repair
- Other

NOTE:

Depending on the particular section or system being covered, not all of the above groups may be used.

We appreciate your input on this manual. If you find any errors or want to comment on the layout of the manual please contact us.

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Recognize Safety Information

Recognize Safety Information



This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe servicing practices.

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Understand Signal Words

Understand Signal Words

A signal word - DANGER, WARNING, or CAUTION - is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

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Special Messages

Special Messages

Your manual contains special messages to bring attention to potential safety concerns, machine damage as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and machine damage.

 ***CAUTION:***

This symbol and text highlight potential hazards or death to the operator or bystanders that may occur if the hazards or procedures are ignored.

IMPORTANT:

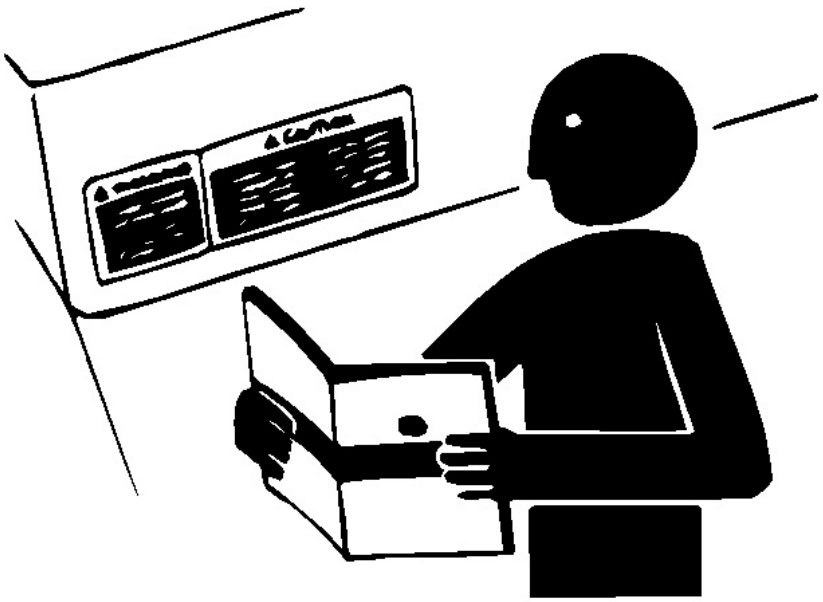
This text is used to tell the operator of actions or conditions that might result in damage to the machine.

NOTE:

General information is given throughout the manual that may help the operator in the operation or service of the machine.

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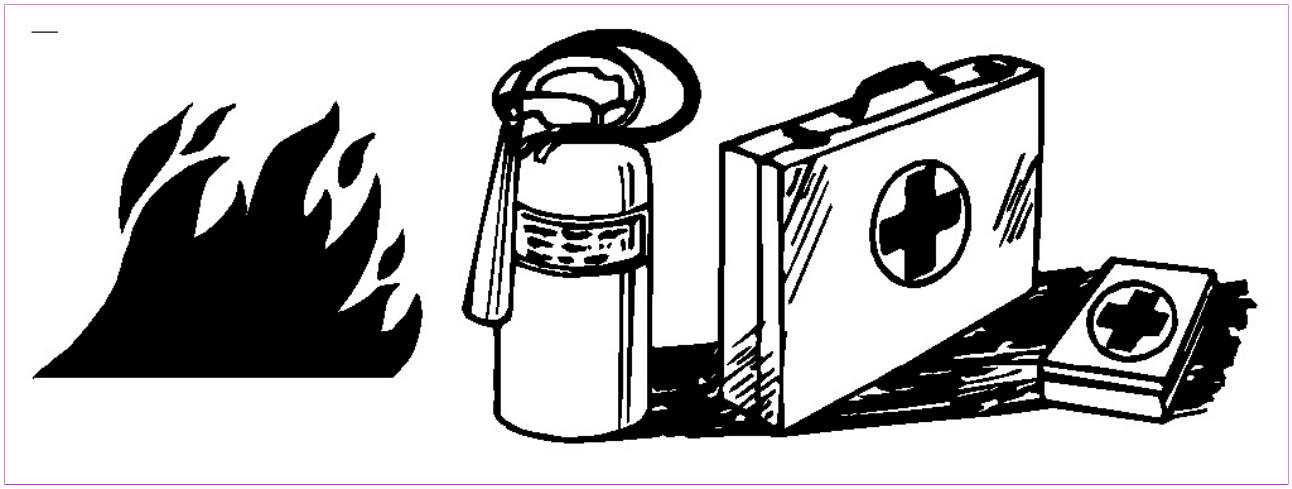
Replace Safety Signs



Replace missing or damaged safety signs. See the machine operator’s manual for correct safety sign placement.

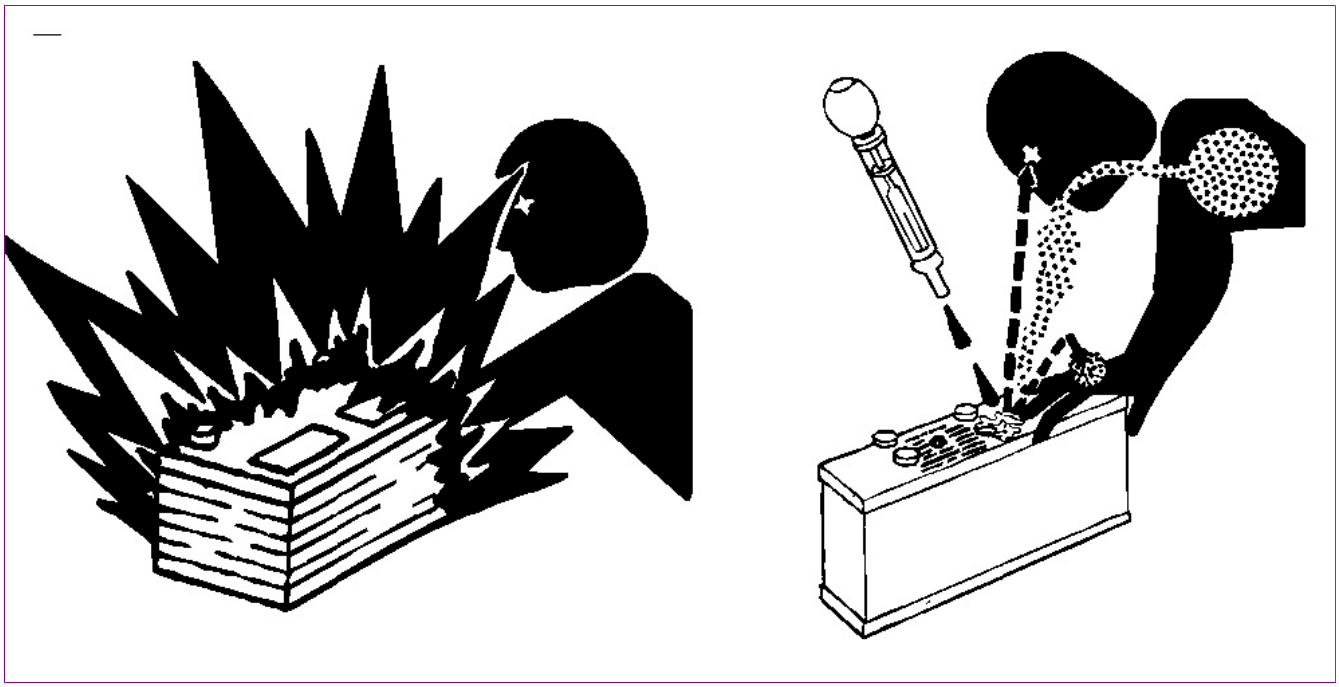
Handle Fluids Safely - Avoid Fires

Be Prepared For Emergencies



- When you work around fuel, do not smoke or work near heaters or other fire hazards.
- Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.
- Make sure machine is clean of trash, grease, and debris.
- Do not store oily rags; they can ignite and burn spontaneously.
- Be prepared if a fire starts.
- Keep a first aid kit and fire extinguisher handy.
- Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

Use Care In Handling and Servicing Batteries



Prevent Battery Explosions

- Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.
- Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.
- Do not charge a frozen battery; it may explode. Warm battery to 16C (60F).

Prevent Acid Burns

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

  Avoid acid burns by:

  - Filling batteries in a well-ventilated area.
  - Wearing eye protection and rubber gloves.
  - Avoiding breathing fumes when electrolyte is added.
  - Avoiding spilling or dripping electrolyte.
  - Use proper jump start procedure.

  If you spill acid on yourself:

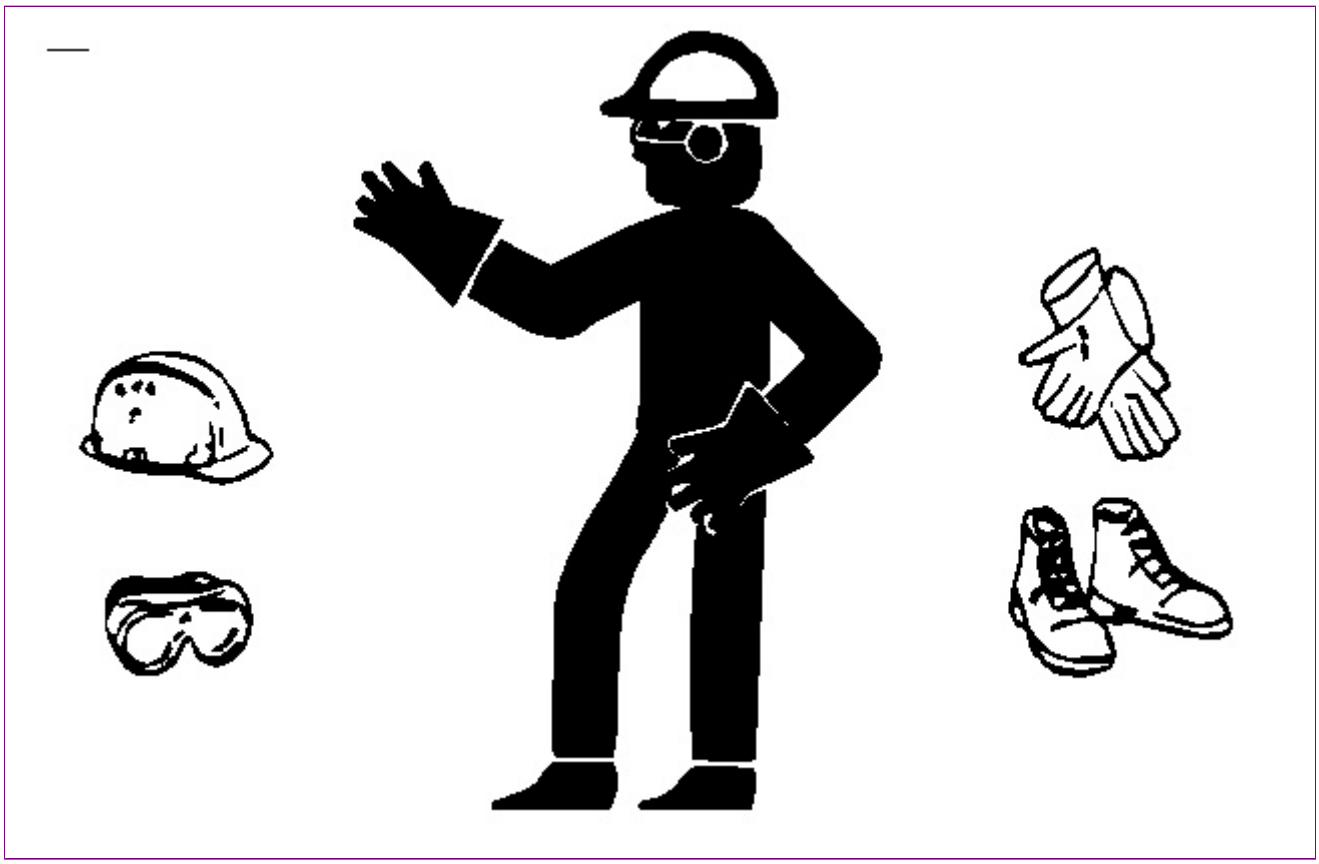
  - Flush your skin with water.
  - Apply baking soda or lime to help neutralize the acid.
  - Flush your eyes with water for 10 - 15 minutes.
  - Get medical attention immediately.

  If acid is swallowed:

  - Drink large amounts of water or milk.
  - Then drink milk of magnesia, beaten eggs, or vegetable oil.
  - Get medical attention immediately.

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Wear Protective Clothing

Wear Protective Clothing



Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

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Parking Safely

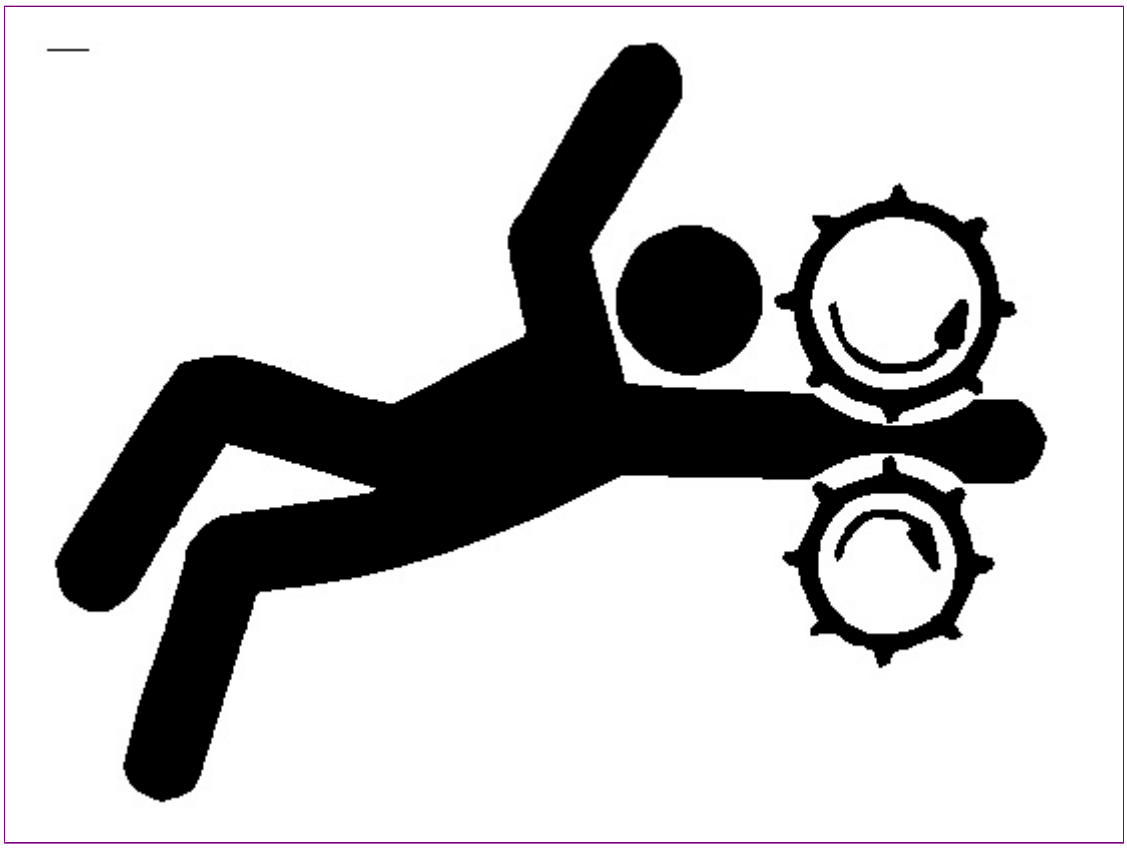
Parking Safely

1. Stop machine on a level surface, not on a slope.
2. Disengage PTO and stop attachments.
3. Lower attachments to the ground.
4. Lock park brake.
5. Stop engine.
6. Remove key.
7. Wait for engine and all moving parts to stop before you leave the operator’s station.
8. Close fuel shut-off valve, if your machine is equipped.

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Service Machines Safely

Service Machines Safely



Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

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Use Proper Tools

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. **DO NOT** use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

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Work in Clean Area

Work in Clean Area

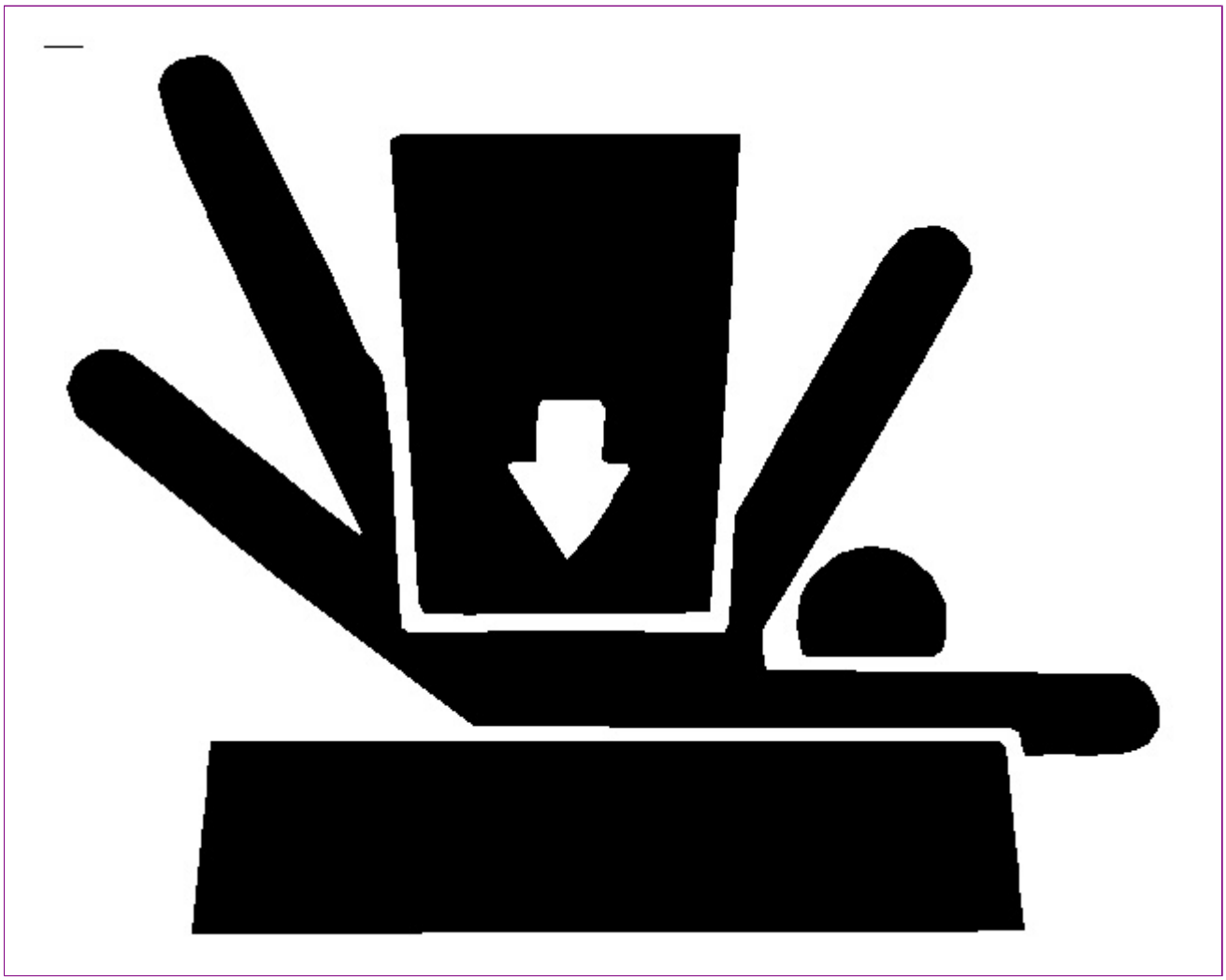
Before starting a job:

1. Clean work area and machine.
2. Make sure you have all necessary tools to do your job.
3. Have the right parts on hand.
4. Read all instructions thoroughly; do not attempt shortcuts.

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Support Machine Properly and Use Proper Lifting Equipment

Support Machine Properly and Use Proper Lifting Equipment



If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

Lifting heavy components incorrectly can cause severe injury or machine damage. Follow recommended procedure for removal and installation of components in the manual.

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Using High Pressure Washers

Using High Pressure Washers

Directing pressurized water at electronic/electrical components or connectors, bearings, hydraulic seals, fuel injection pumps or other sensitive parts and components may cause product malfunctions. Reduce pressure and spray at a 45 to 90 degree angle.

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Illuminate Work Area Safely

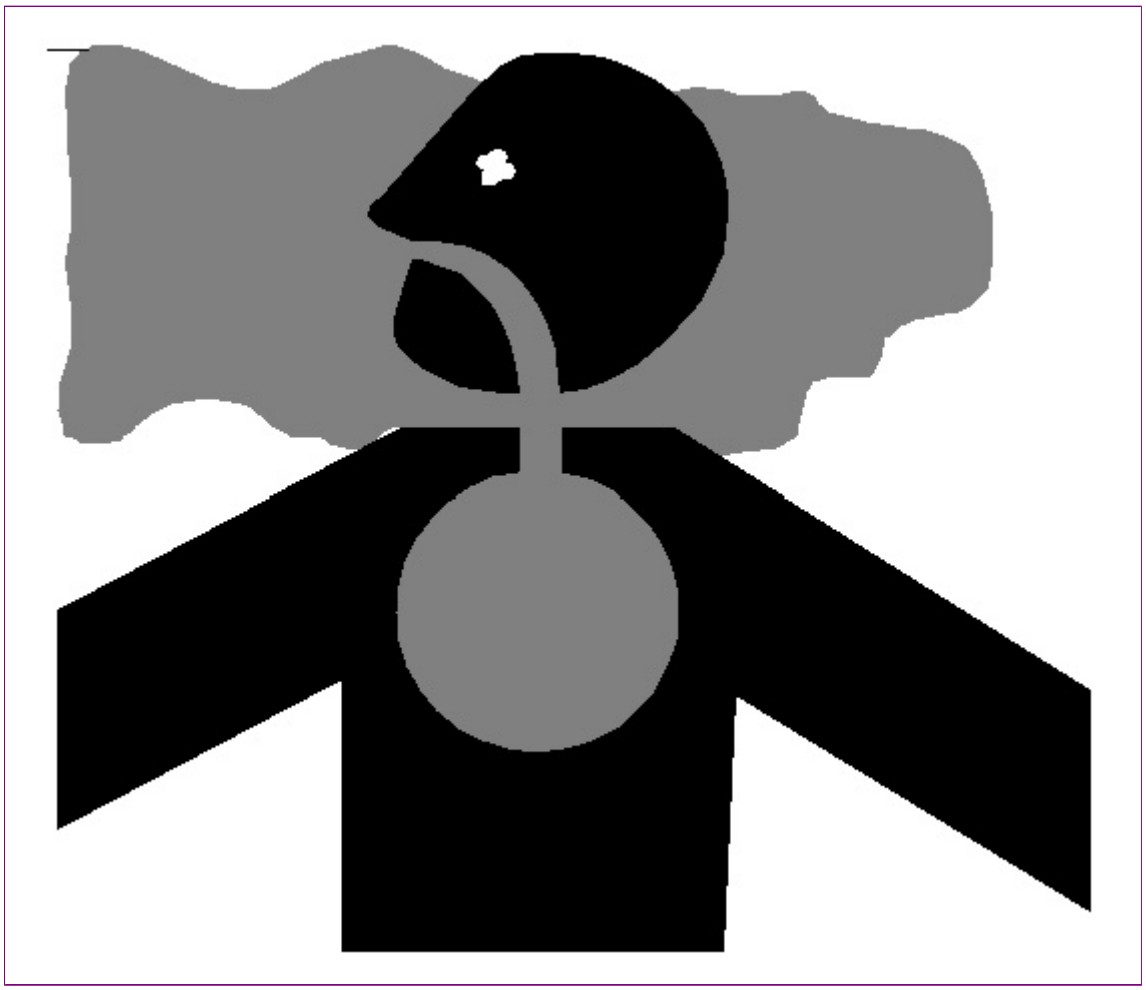
Illuminate Work Area Safely

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

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Work In Ventilated Area

Work In Ventilated Area



Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

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Warning: California Proposition 65 Warning

Warning: California Proposition 65 Warning

Gasoline engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

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Remove Paint Before Welding or Heating

Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. Do all work outside or in a well ventilated area. Dispose of paint and solvent properly. Remove paint before welding or heating: If you sand or grind paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

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Avoid Harmful Asbestos Dust

Avoid Harmful Asbestos Dust

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

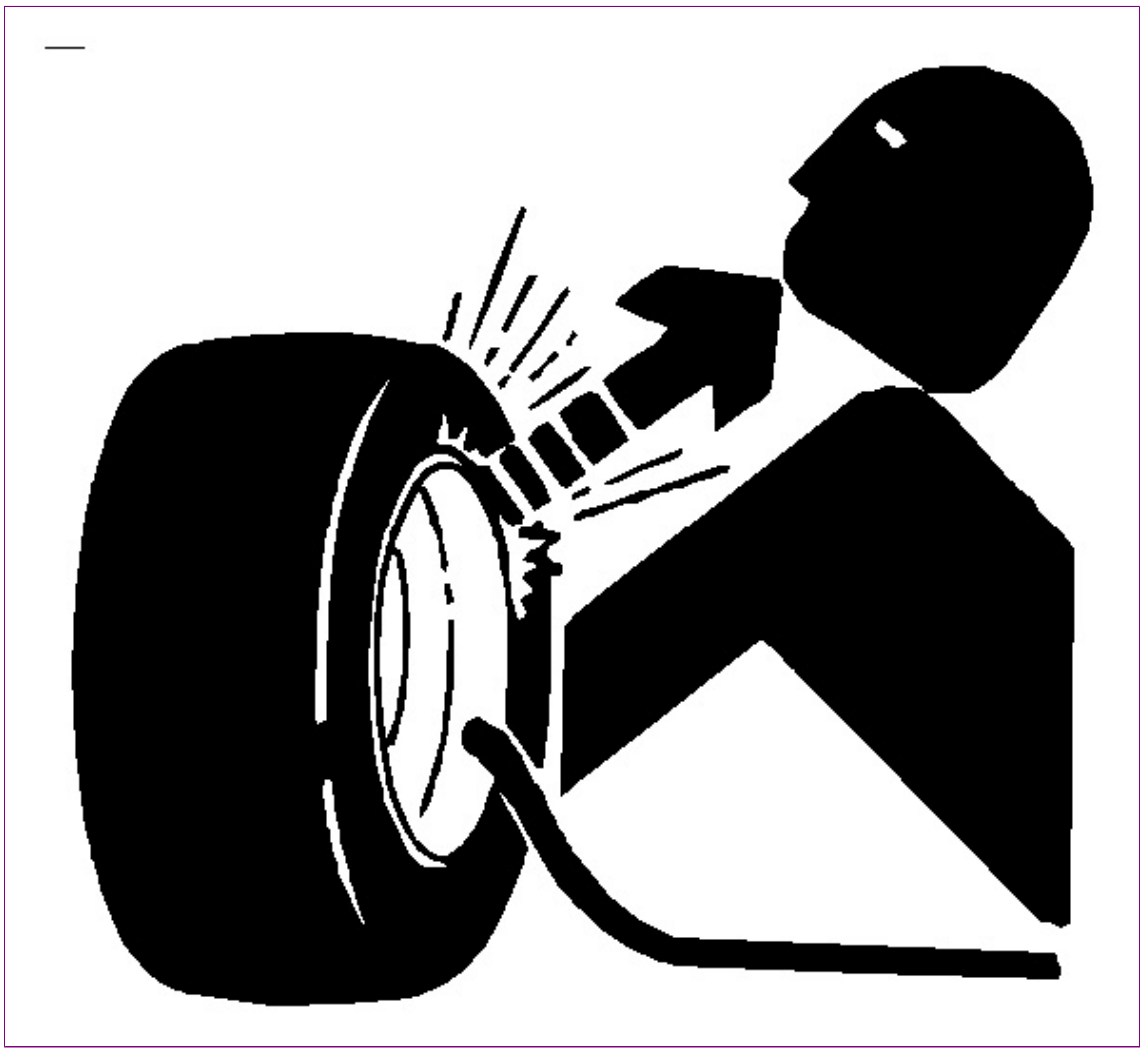
Components in products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding material containing asbestos. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, apply a mist of oil or water on the material containing asbestos. Keep bystanders away from the area.

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Service Tires Safely

Service Tires Safely



Explosive separation of a tire and rim parts can cause serious injury or death.

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

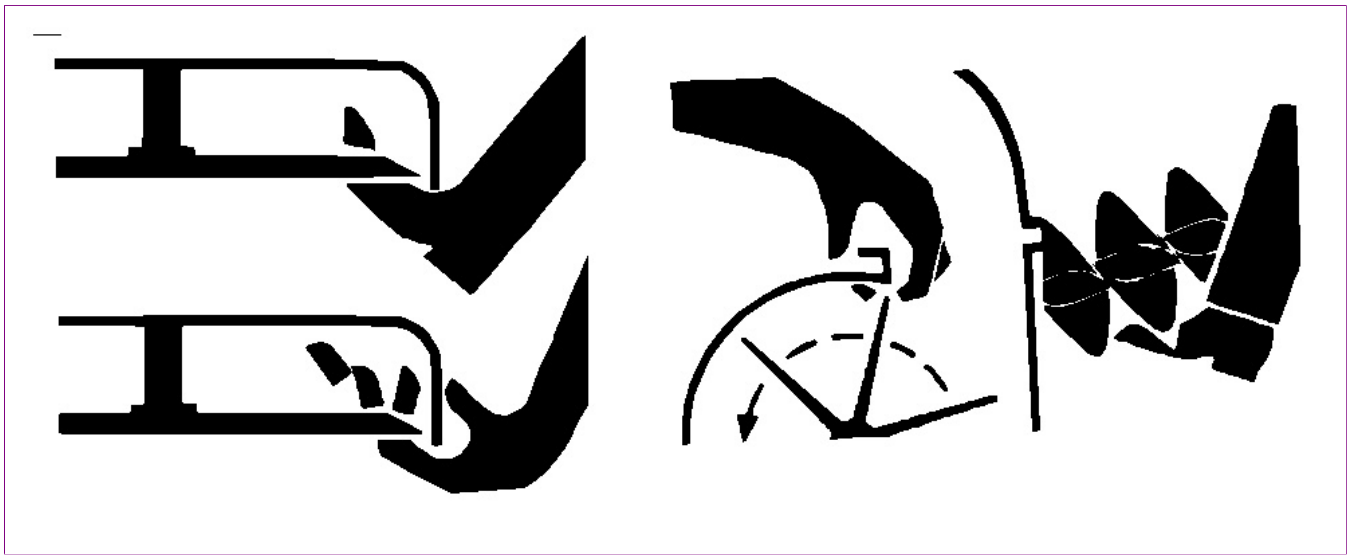
When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

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Avoid Injury From Rotating Blades, Augers and Shafts

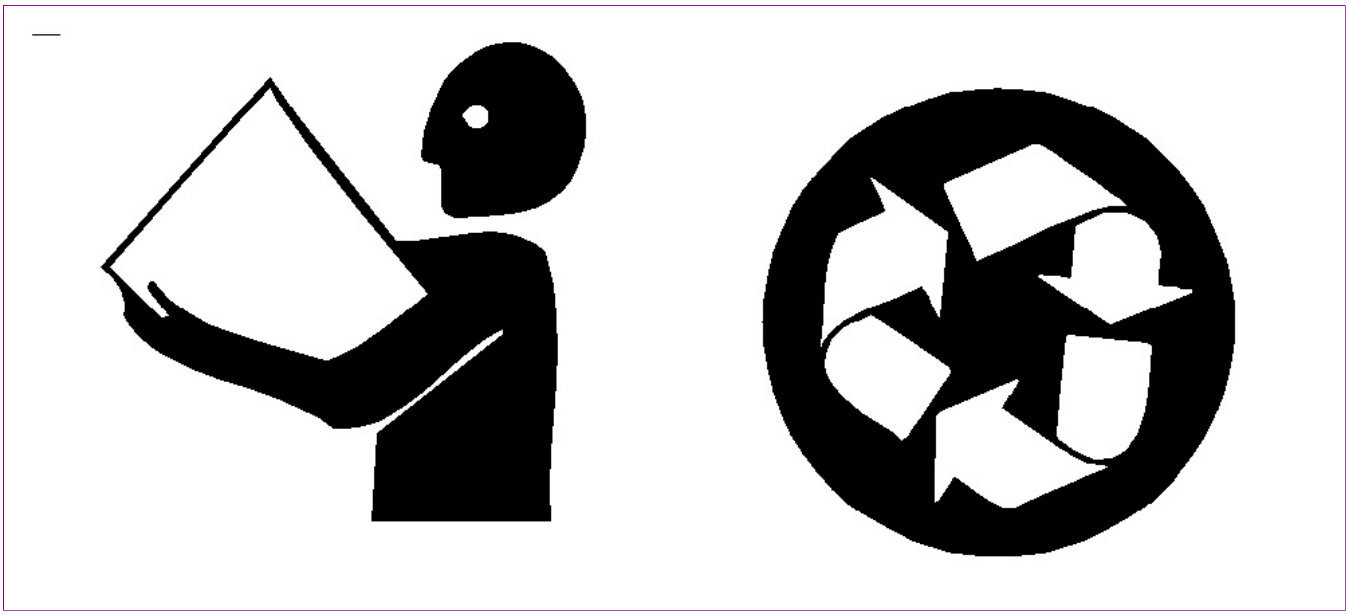
Avoid Injury From Rotating Blades, Augers and Shafts



Keep hands and feet away while machine is running. Shut off power to service, lubricate or remove mower blades, augers or PTO shafts.

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Handle Chemical Products Safely



Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

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Dispose of Waste Properly

Dispose of Waste Properly

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries. Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them. Do not pour waste onto the ground, down a drain, or into any water source. Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.

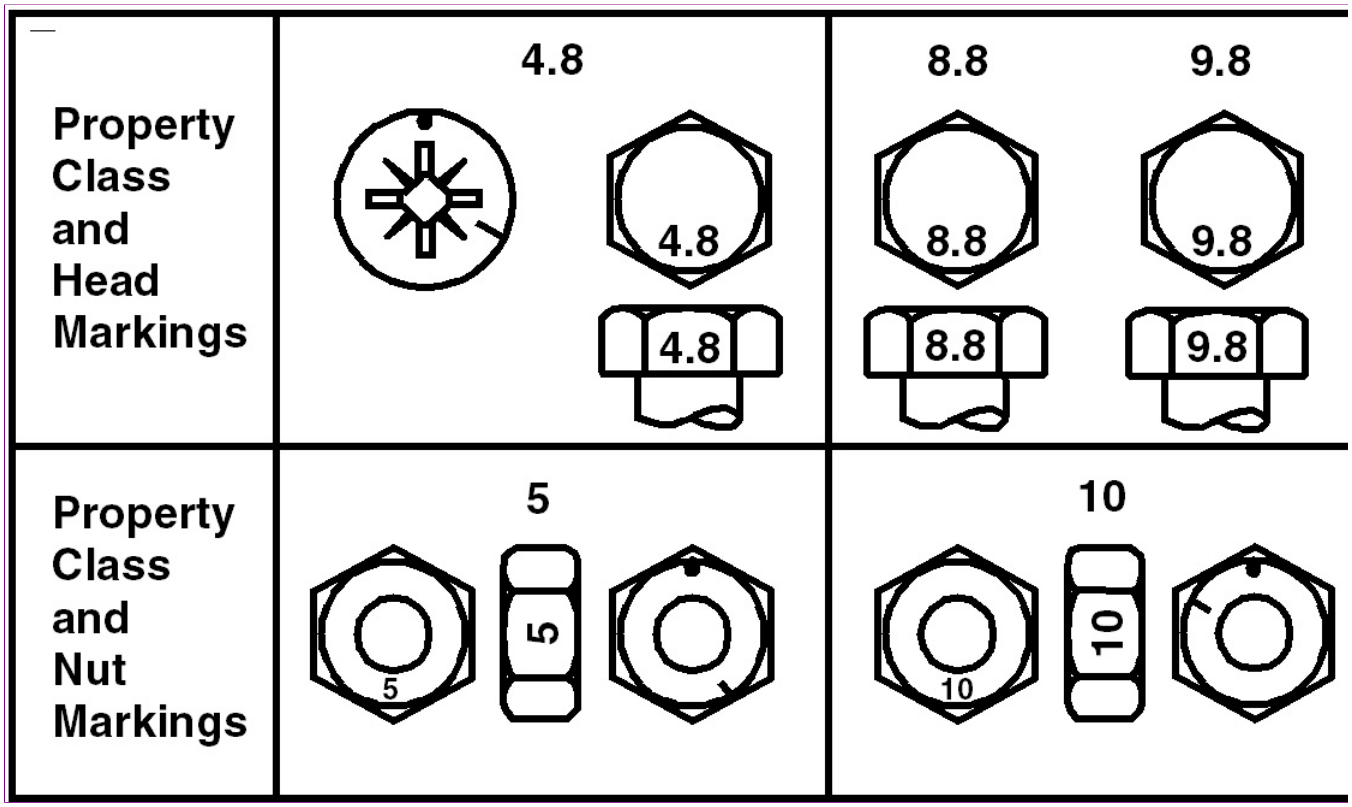
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Live with Safety



Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

Metric Fastener Torque Values



	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	109
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

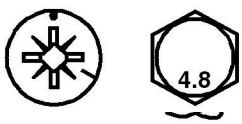
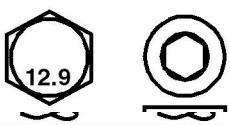
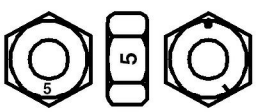
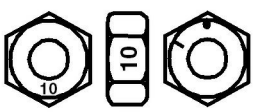
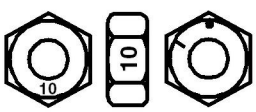
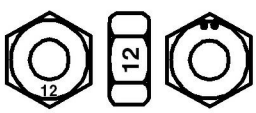
Fasteners should be replaced with the same grade. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque values should be applied to the NUT instead of the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

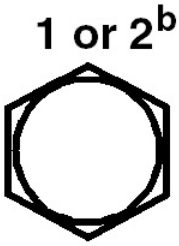
a *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication* .

Reference: JDS - G200.

Property Class and Head	4.8 	8.8 	9.8 	10.9 	12.9 
Property Class and Nut Markings	5 	10 	10 	12 	

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Inch Fastener Torque Values

Inch Fastener Torque Values

SAE Grade and Head Markings	**No Marks**  **1 or 2[b]**
SAE Grade and Nut Markings	**No Marks**  **2**

	Grade 1				Grade 2b				Grade 5, 5.1 or 5.2				Grade 8 or 8.2			
	Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	215	160	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	470	300	510	375	470	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same grade. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

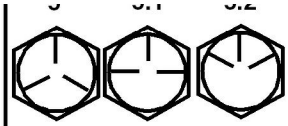
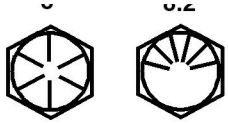
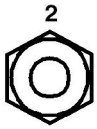
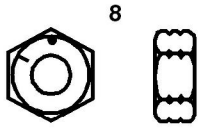
When bolt and nut combination fasteners are used, torque values should be applied to the NUT instead of the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

a *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication .*

b *"Grade 2" applies for hex cap screws (Not Hex Bolts) up to 152 mm (6 in.) long. "Grade 1" applies for hex cap screws over 152 mm (6 in.) long, and for all other types of bolts and screws of any length.*

Reference: JDS - G200

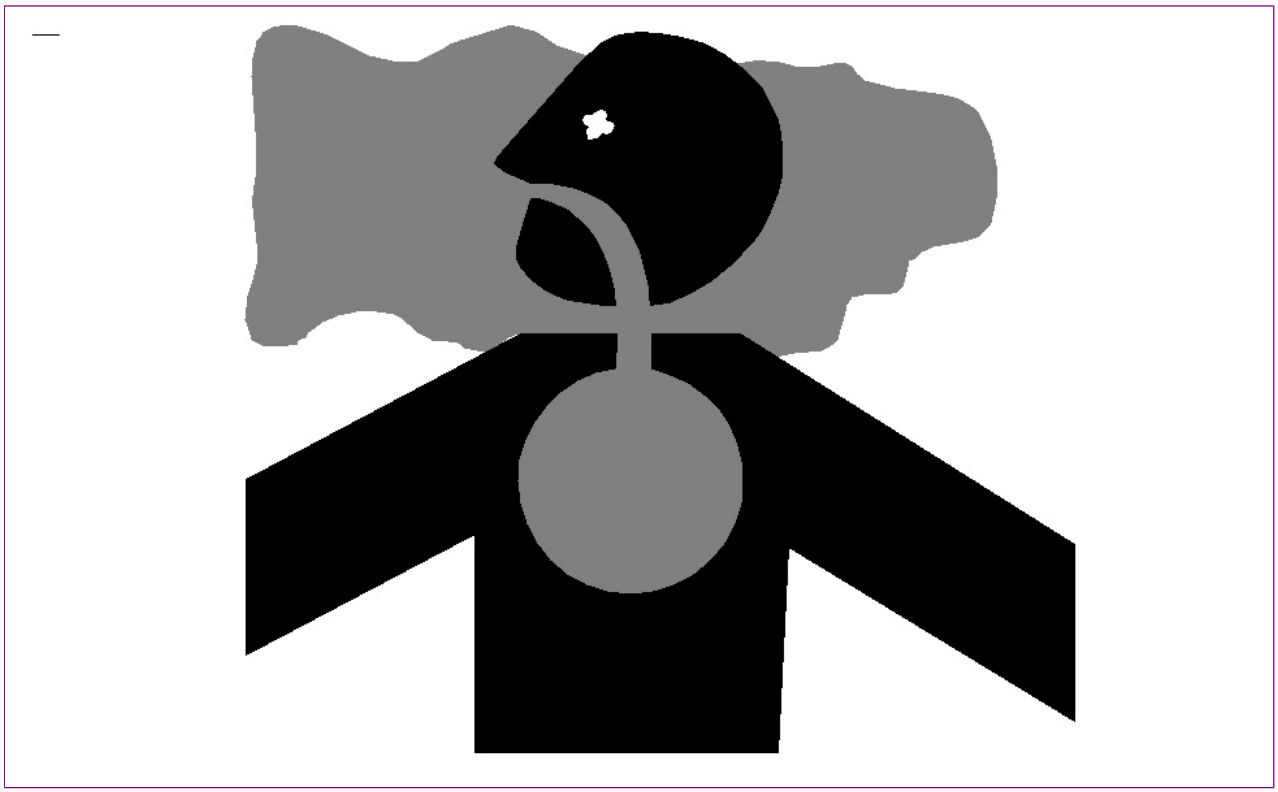
SAE Grade and Head Markings	No Marks 		
SAE Grade and Nut Markings	No Marks 2 	5 	8 

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Metric Fastener Torque Value - Grade 7

Metric Fastener Torque Value - Grade 7

Size	Steel or Gray Iron Torque	Aluminum Torque
	N•m (lb-ft)	N•m (lb-ft)
M6	11 (8)	8 (6)
M8	24 (18)	19 (14)
M10	52 (38)	41 (30)
M12	88 (65)	70 (52)
M14	138 (102)	111 (82)
M16	224 (165)	179 (132)

Gasoline



CAUTION:

Fuel vapors are explosive and flammable:

- ***Shut engine off and allow to cool before filling fuel tank.***
- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Fill fuel tank outdoors or in well ventilated area.***
- ***Clean up spilled fuel immediately.***
- ***Use clean approved non-metal container to prevent static electric discharge.***
- ***Use clean approved plastic funnel without screen or filter to prevent static electric discharge.***
- ***Loosen fuel cap slowly to release pressure and to keep fuel from escaping around the cap.***

To avoid engine damage:

- DO NOT mix oil with gasoline
- ONLY use clean, fresh unleaded gasoline with an octane rating (anti-knock index) of 87 or higher
- fill gas tank at the end of each day's operation to help prevent condensation from forming inside a partially filled tank
- keep up with specified service intervals

Use of alternative oxygenated, gasohol blended, unleaded gasoline is acceptable as long as:

- the ethyl or grain alcohol blends DO NOT exceed 10% by volume or
- methyl tertiary butyl ether (MTBE) blends DO NOT exceed 15% by volume

CAUTION:

California Proposition 65 Warning: Gasoline engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Gasoline Storage

Gasoline Storage

IMPORTANT:

Keep all dirt, scale, water or other foreign material out of gasoline.

Keep gasoline stored in a safe, protected area. Storage of gasoline in a clean, properly marked (“UNLEADED GASOLINE”) POLYETHYLENE PLASTIC container WITHOUT any metal screen or filter is recommended. DO NOT use de-icers to attempt to remove water from gasoline or depend on fuel filters to remove water from gasoline. Use a water separator installed in the storage tank outlet. BE SURE to properly discard unstable or contaminated gasoline. When storing machine or gasoline, it is recommended that you add **John Deere Gasoline Conditioner and Stabilizer (TY15977)** or an equivalent to the gasoline. BE SURE to follow directions on container and to properly discard empty container.

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4 - Cycle Gasoline Engine Oil

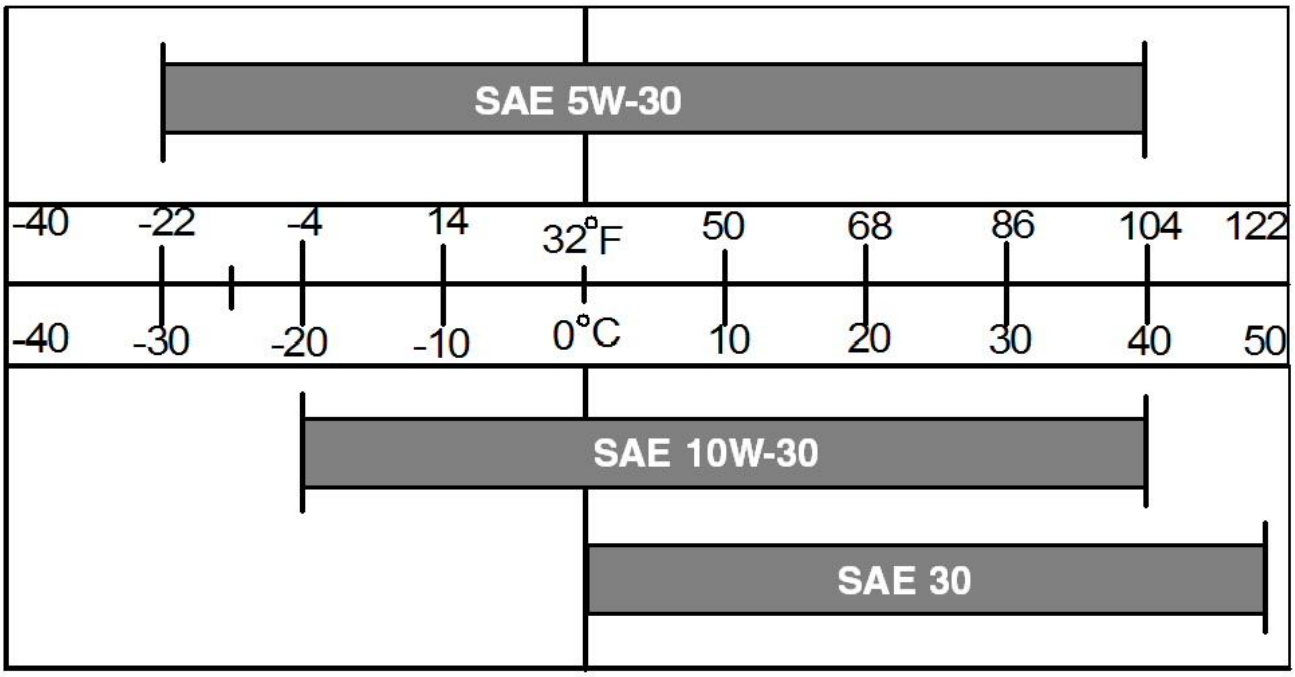
Use oil viscosity based on the expected air temperature range during the period between oil changes.

The following John Deere oil is PREFERRED:

- **TURF - GARD®** .
- **PLUS - 4®**

Other oils may be used if above John Deere oils are not available, provided they meet the following specification:

- **API service Classification SG or higher**



Break-In Engine Oil - 4-Cycle Gasoline

IMPORTANT:

ONLY use a quality break-in oil in rebuilt or remanufactured engines for the first 5 hours (maximum) of operation. DO NOT use oils with heavier viscosity weights than SAE 5W-30, these oils will not allow rebuilt or remanufactured engines to break-in properly.

The following John Deere oil is PREFERRED:

- **BREAK - IN ENGINE OIL** .

John Deere BREAK - IN ENGINE OIL is formulated with special additives for aluminum and cast iron type engines to allow the power cylinder components (pistons, rings, and liners as well) to “wear-in” while protecting other engine components, valve train and gears, from abnormal wear. Engine rebuild instructions should be followed closely to determine if special requirements are necessary.

John Deere BREAK-IN ENGINE OIL is also recommended for non-John Deere engines, both aluminum and cast iron types.

The following John Deere oil is **also recommended** :

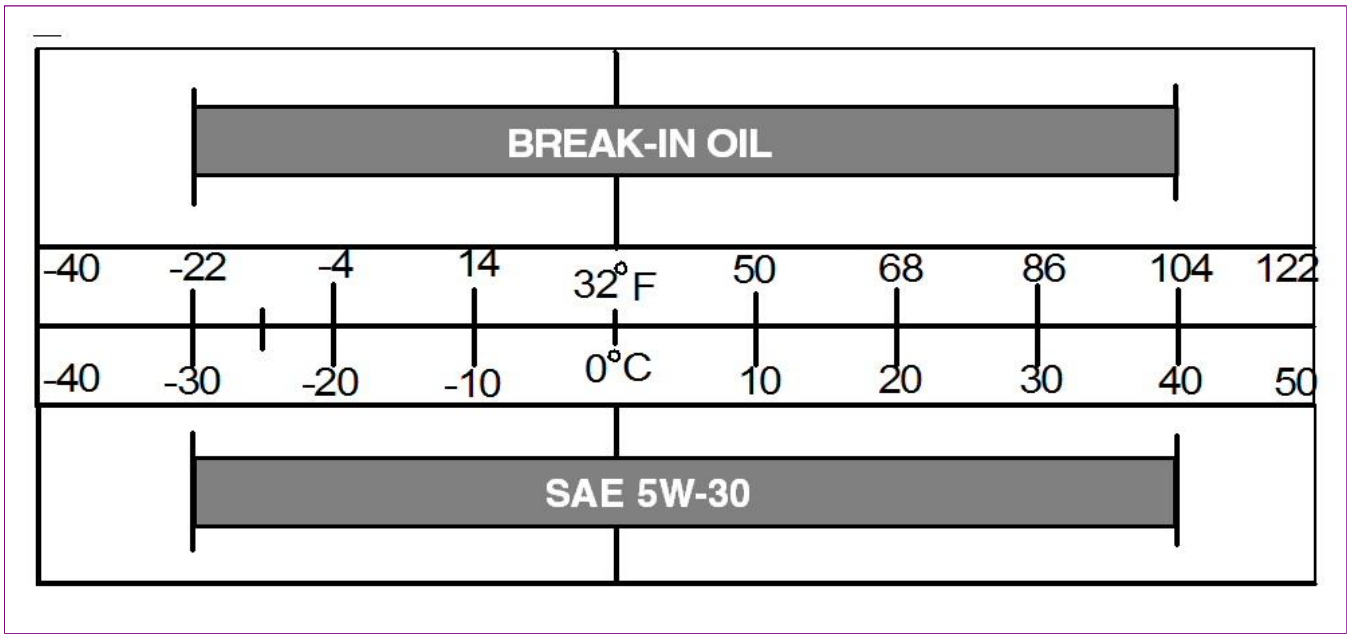
- **TORQ - GARD SUPREME® - SAE 5W-30.**

If the above recommended John Deere oils are not available, use a break-in engine oil meeting the following specification during the first **5 hours (maximum)** of operation:

- SAE 5W-30 - API Service Classification SE or higher.

IMPORTANT:

After the break-in period, use the John Deere oil that is recommended for this engine.



tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Alternative Lubricants

Alternative Lubricants

Conditions in certain geographical areas outside the United States and Canada may require different lubricant recommendations than the ones printed in this technical manual or the operator's manual. Consult with your John Deere Dealer, or Sales Branch, to obtain the alternative lubricant recommendations.

IMPORTANT:

Use of alternative lubricants could cause reduced life of the component.

If alternative lubricants are to be used, it is recommended that the factory fill be thoroughly removed before switching to any alternative lubricant.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Synthetic Lubricants

Synthetic Lubricants

Synthetic lubricants may be used in John Deere equipment if they meet the applicable performance requirements (industry classification and/or military specification) as shown in this manual.

The recommended air temperature limits and service or lubricant change intervals should be maintained as shown in the operator's manual, unless otherwise stated on lubricant label.

Avoid mixing different brands, grades, or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements. Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Lubricant Storage

Lubricant Storage

All machines operate at top efficiency only when clean lubricants are used. Use clean storage containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination. Store drums on their sides. Make sure all containers are properly marked as to their contents. Dispose of all old, used containers and their contents properly.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Mixing of Lubricants

Mixing of Lubricants

In general, avoid mixing different brands or types of lubricants. Manufacturers blend additives in their lubricants to meet certain specifications and performance requirements. Mixing different lubricants can interfere with the proper functioning of these additives and lubricant properties which will downgrade their intended specified performance.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Grease

Grease

IMPORTANT:

Use recommended John Deere greases to avoid component failure and premature wear.

The recommended John Deere greases are effective within an average air temperature range of -29 to 135 degrees C (-20 to 275 degrees F).

If operating outside that temperature range, contact your Servicing dealer for a special-use grease.

The following greases are preferred:

- John Deere Multi-Purpose SD Polyurea Grease
- John Deere Multi-Purpose HD Lithium Complex Grease

If not using any of the preferred greases, be sure to use a general all-purpose grease with an NLGI grade No.2 rating.

Wet or high speed conditions may require use of a special-use grease. Contact your Servicing dealer for information.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Hydrostatic Transmission Oil

Hydrostatic Transmission Oil

These machines are equipped with a internal wet disc brake transmission (Hydrostatic transmission).

IMPORTANT:

Use ONLY the following oils for service. DO NOT use automatic transmission fluid.

NOTE:

The T40 and K46 transmissions are filled with 10W30 engine oil at the factory.

For the T40 or K46 transmissions used in extreme or high-hour applications, J20C Hygard Hydraulic oil or 5W-50 Synthetic Engine Oil is approved as an optional fill. Use only after a complete drain of the factory oil.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Machine Product Identification Number

Machine Product Identification Number

If you need to contact an Authorized Service Center for information on servicing, always provide the product model and identification numbers.

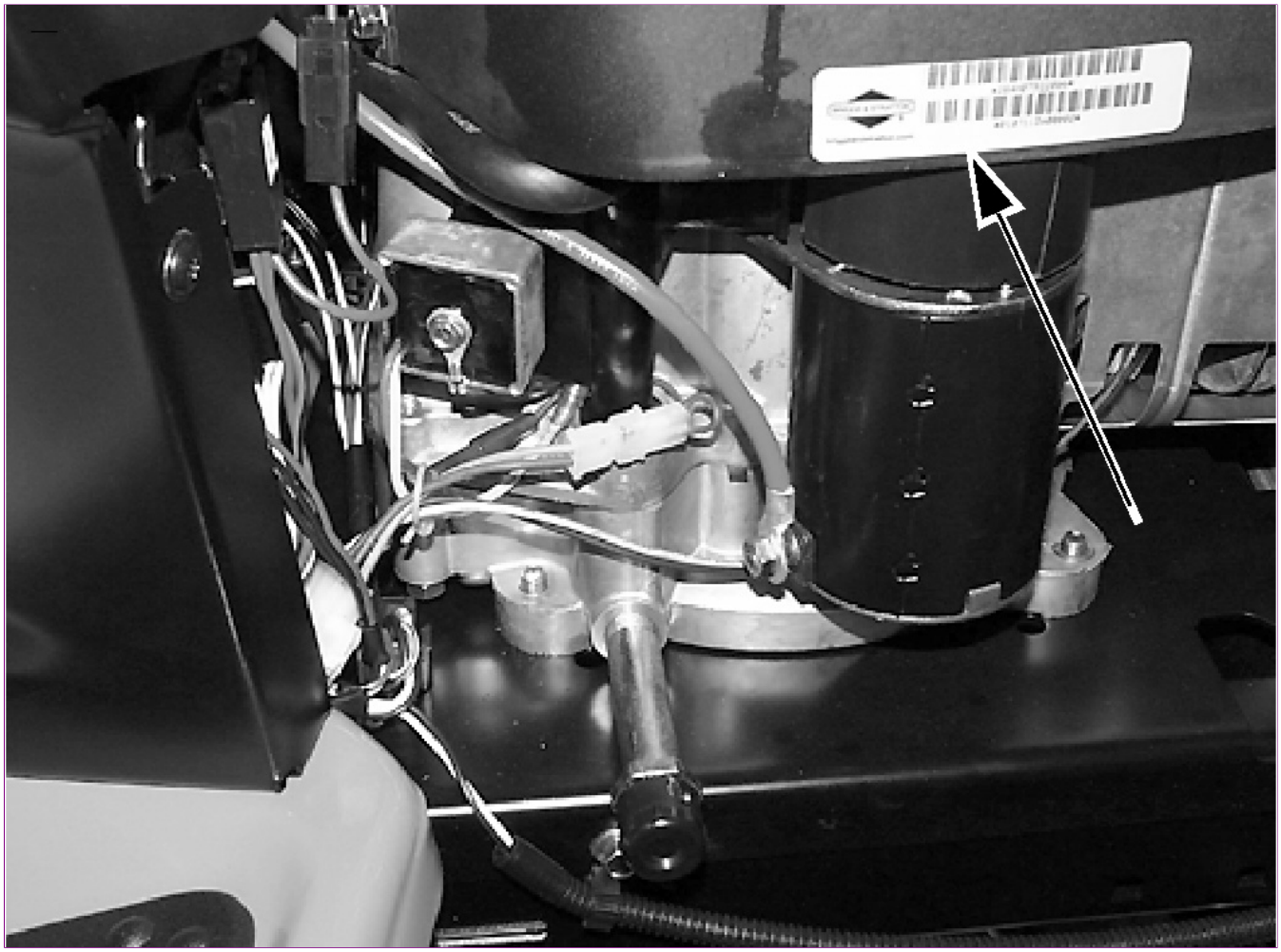
When ordering parts or submitting a warranty claim, it is IMPORTANT that the machine product identification number (PIN) and component serial numbers are included. The location of the PIN and component serial numbers are shown.



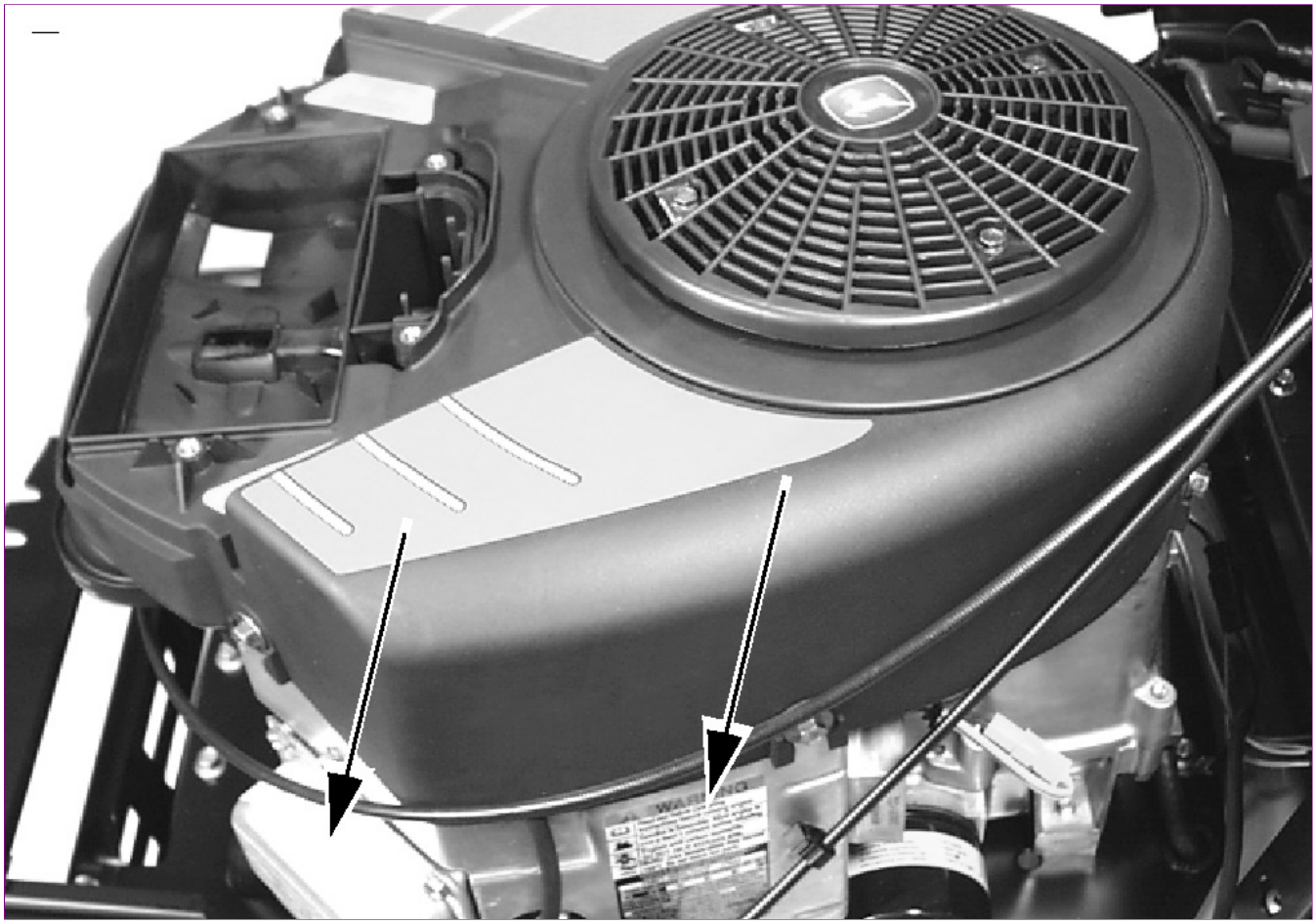
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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Engine Serial Number

Engine Serial Number



Single Cylinder Engines



V-Twin Engines

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Transaxle Serial Number

Transaxle Serial Number

Located on back-right side of transaxle.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
General Specifications

General Specifications

Item	Measurement	Specification
Specifications:		
Make		Briggs & Stratton
Series		Intek
Type		Gasoline
Stroke/Cycle		4
Model (LA105 and LA115)		31P677-0132
Model (LA115 CA)		31P677-0134
Model (LA125 CA)		331877-0114
Cylinders		1
Valves		Overhead Valves
Displacement (31P677)		501 cm^3 30.59 cu in.)
Bore (31P677)		90.48 mm 3.562 in.)
Displacement (331877)		540 cm^3 32.95 cu in.)
Bore (331877)		94.02 mm 3.702 in.)
Stroke (All Models)		77.78 mm 3.06 in.)
Cooling System		Air Cooled
Lubrication 31P677 engine		Pressurized with Filter
Lubrication 331877 engine		Pressurized with Filter
Crankcase Oil Capacity		1.4 L 1.5 qt)
Air Cleaner		Paper with outer foam element
Muffler		Horizontal discharge below frame
Fuel Filter		Replaceable (In-Line Type)
Aspiration		Normal
Alternator		9 amp regulated

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Tests and Adjustments Specifications

Tests and Adjustments Specifications

Item	Measurement	Specification
Valve Clearance:		
Slow Idle (governed)		1750 ± 50 rpm
Slow Idle (governed)		2200 ± 300 rpm
Fast Idle		3350 ± 100 rpm
Spark Plug Gap		0.76 mm 0.030 in.)
Spark Plug Torque		20 N•m 180 lb-in.)
Valve Clearance - Intake		0.08 - 0.13 mm 0.003 - 0.005 in.)
Valve Clearance - Exhaust		0.13 - 0.18 mm 0.005 - 0.007 in.)
Valve Guide Depth		0.12 - 0.15 mm 0.005 - 0.006 in.)
Magneto Air Gap		0.25 - 0.35 mm 0.010 - 0.014 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Repair Specifications

Repair Specifications

Item	Measurement	Specification
Cylinder Bore, Pistons and Rings (31P677):		
Cylinder Bore Maximum Dimension		90.50 mm 3.563 in.)
Cylinder Bore Minimum Dimension		90.48 mm 3.562 in.)
Cylinder Bore Out of Round (maximum)		0.04 mm 0.002 in.)
Piston Pin (Wear Limit		20.29 mm 0.799 in.)
Piston Pin Bore (Wear Limit)		20.35 mm 0.801 in.)

Item	Measurement	Specification
Cylinder Bore, Pistons and Rings (331877):		
Cylinder Bore Maximum Dimension		94.06 mm 3.703 in.)
Cylinder Bore Minimum Dimension		94.02 mm 3.702 in.)
Cylinder Bore Out of Round (maximum)		0.04 mm 0.002 in.)
Piston Pin (Wear Limit		20.29 mm 0.799 in.)
Piston Pin Bore (Wear Limit)		20.35 mm 0.801 in.)

Item	Measurement	Specification
Ring End Gap (Wear Limit) Case Iron Bore:		
Compression Ring (Top)		0.64 mm 0.025 in.)
Compression Ring (Center)		0.76 mm 0.030 in.)
Oil Ring		0.76 mm 0.030 in.)
Compression and Oil Ring Groove Wear Limit (New Rings Installed)		0.15 mm 0.006 in.)

Item	Measurement	Specification
Valves:		
Valve Guide (Wear Limit)		6.09 mm 0.240 in.)
Valve Seat Width		0.79 - 1.98 mm 0.031 - 0.078 in.)
Valve Margin (Minimum)		0.40 mm 0.016 in.)
Valve Face Angle		45
Valve Seat Narrowing Angle		30

Item	Measurement	Specification
Connecting Rod and Crankshaft:		
Connecting Rod Crankpin (Wear Limit)		38.15 mm 1.502 in.)
Connecting Rod Piston Pin Bearing (Wear Limit)		20.37 mm 0.802 in.)
Crankshaft PTO Journal (Wear Limit)		41.20 mm 1.622 in.)
Crankshaft Magneto Journal (Wear Limit)		34.95 mm 1.376 in.)
Crankshaft Crankpin Journal (Wear Limit)		38.02 mm 1.497 in.)
Crankshaft Eccentric Journal (Wear Limit)		55.93 mm 2.202 in.)
PTO Bearing (Wear Limit)		41.37 mm 1.629 in.)
Magneto Bearing (Wear Limit)		35.13 mm 1.383 in.)
Crankshaft End Play		0.05 - 0.58 mm 0.002 - 0.023 in.)
Cam Gear PTO Journal (Wear Limit)		12.65 mm 0.498 in.)
Cam Gear Magneto Journal (Wear Limit)		12.65 mm 0.498 in.)
Cam Lobe (Wear Limit)		30.07 mm 1.184 in.)
Cam Gear Bearing (Wear Limit)		12.80 mm 0.504 in.)
Compression Release Lobe		0.25 mm 0.010 in.)

Item	Measurement	Specification
Counterweight:		

Crankshaft Eccentric Journal (Wear Limit)	55.93 mm 2.202 in.)
Counterweight Link Bearing (Wear Limit)	56.13 mm 2.210 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Torque Specifications (Alphabetical)

Torque Specifications (Alphabetical)

Item	Measurement	Specification
Specifications:		
Armature Mounting Screws		2.8 N•m 25 lb-in.)
Blower Housing Screws		10 N•m 85 lb-in.)
Breather Mounting Bolts		3 N•m 25 lb-in.)
Carburetor to Intake Manifold		8 N•m 70 lb-in.)
Carburetor Bowl Screw		4.5 N•m 40 lb-in.)
Connecting Rod Cap Screws		17 N•m 150 lb-in.)
Control Bracket Screws		3.4 N•m 30 lb-in.)
Cylinder Head Cap Screws		25 N•m 220 lb-in.)
Drive Belt Idler Pulley		9.6 N•m 85 lb-in.)
Engine Mounting Bolts		32 N•m 24 lb-ft)
Engine Output Pulley Assembly		75 N•m 55 lb-ft)
Exhaust Manifold		18.5 N•m 165 lb-in.)
Flywheel Fan Screws		16 N•m 140 lb-in.)
Flywheel Nut		136 N•m 100 lb-ft)
Flywheel Screen Screws		4.5 N•m 40 lb-in.)
Fuel Pump Bracket		7.3 N•m 65 lb-in.)
Fuel Pump to Bracket		4.0 N•m 35 lb-in.)
Fuel Shutoff Solenoid		5 N•m 44 lb-in.)

Governor Arm Lock Nut	4.5 N•m 40 lb-in.)
Heat Shield Screws	4.5 N•m 40 lb-in.)
Ignition Armature	2.8 N•m 25 lb-in.)
Intake Manifold Elbow	11 N•m 100 lb-in.)
Oil Filter Adaptor Screws	14 N•m 125 lb-in.)
Oil Pump Cover Screws	9 N•m 80 lb-in.)
Rocker Arm Adjustment Lock Nut	5 N•m 45 lb-in.)
Rocker Arm Mounting	11.3 N•m 100 lb-in.)
Spark Plug	20 N•m 180 lb-in.)
Starting Motor Mounting Bolts	16 N•m 140 lb-in.)
Starting Motor Through Bolts	6 N•m 50 lb-in.)
Stator to Cylinder Block	2.3 N•m 21 lb-in.)
Sump Cover	20 N•m 180 lb-in.)
Throttle Cable Clamp	3 N•m 25 lb-in.)
Throttle Valve Plate	4.5 N•m 40 lb-in.)
Valve Cover Nuts	6 N•m 55 lb-in.)
Voltage Regulator/Rectifier	7.3 N•m 65 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Special or Essential Tools

Special or Essential Tools

Pulse Tachometer, or Digital Tachometer.....JT07270
JT05719
Governor, and governed and slow idle adjustments.

Cylinder Leak Tester.....JTO3502
Cylinder leakdown test.

Vacuum Gauge Bar Fitting Line and Plug.....JT03503JT05703 JT05699 and 8741-F66
Crankcase vacuum test.

Briggs & Stratton Flywheel Tool.....B&S Tool No. 19203
Remove flywheel.

NOTE:

Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).

Other Materials

Number	Name	Use
PM37418 LOCTITE 242 (U.S.)	Thread Lock and Sealer (Medium Strength)	Apply to threads of throttle and choke plate screws
PM37397 LOCTITE 592 (U.S.)	Thread Sealant (General Purpose) with TEFLON	Apply to threads of pipe plugs.
TY24416 (U.S.)	Multipurpose Lithium Grease	Apply to engine crankshaft and lube oil seals
TY26181 (U.S.)	John Deere NEVER-SEEZ ™ Lubricant	Apply to crankshaft end
(U.S.)	SCOTCH-BRIGHT ™ Abrasive Sheets/Pads	Clean cylinder head.
(U.S.)	Valve Guide Cleaner	Clean valve guides.
(U.S.)	Stanisol or Kerosene	Finish ream valve guide.
(U.S.)	Prussian Blue Compound	Check valve seat contact.
(U.S.)	Zinc Oxide/Wood Alcohol	Check block for cracks.
(U.S.)	Mineral Spirits	Clean electric starter armature.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Problems

Starting Problems

CAUTION:

Keep away from all moving parts when testing. The engine may start to rotate at any time.

NOTE:

To test specific electrical components, see Electrical section and refer to either Diagnostics or Tests and Adjustments for further guidance.

Symptom	Problem	Solution
Engine Will Not Crank	Battery	Charge and test battery. See Battery Voltage and Specific Gravity Tests in the Electrical section.
		Replace the battery if it will not take or hold a charge.
	Starting Motor Solenoid does not click when ignition switch is turned to start position.	Cranking circuit problem. See Cranking Circuit Diagnosis - All Models in the Electrical section.
		Key switch malfunction. See Key Switch Test in the Electrical section.
		Starting motor solenoid malfunction. See Starting Solenoid Test - All Models in the Electrical section.

CAUTION:

Do not rotate engine with starter if the spark plug is removed. Gasoline spray from the open cylinder may be ignited by ignition spark and cause an explosion or fire.

NOTE:

Perform a visual inspection first to determine if battery cables are tight and not corroded. The battery must be sufficient size to turn the engine over at minimum cranking speed of 350 rpm.

Symptom	Problem	Solution
Engine Cranks But Will Not Start	Engine cranks slowly.	Charge and test battery. See Battery Voltage and Specific Gravity Tests in the Electrical section.
		Replace the battery if it will not hold a charge.
	Poor or no spark at spark plug.	Replace spark plug,
		Ignition coil gap incorrect. See Armature Air Gap Adjustment .
		Magneto shorted to ground, flywheel magnet weak.
	Choke or throttle not adjusted properly.	Adjust cable. See Throttle Cable Adjustment .
	Fuel supply.	Check air cleaner, fuel mixture, possible contaminated fuel, or stuck float needle.
		Check fuel shutoff valve, fuel lines, fuel pump, and engine vacuum.
	Fuel shutoff solenoid does not open when ignition switch is turned to start/run.	Check fuel solenoid and ignition circuit. See Ignition and Shutoff Circuit Diagnosis - All Models and See Fuel Shutoff Solenoid Test in the Electrical section.
	Valve clearance improperly.	Check and adjust valve clearance. See Valve Clearance Adjustment .
	Internal components binding.	Remove spark plug and turn the engine over by hand. If the engine is hard to turn over by hand repair or replace engine.

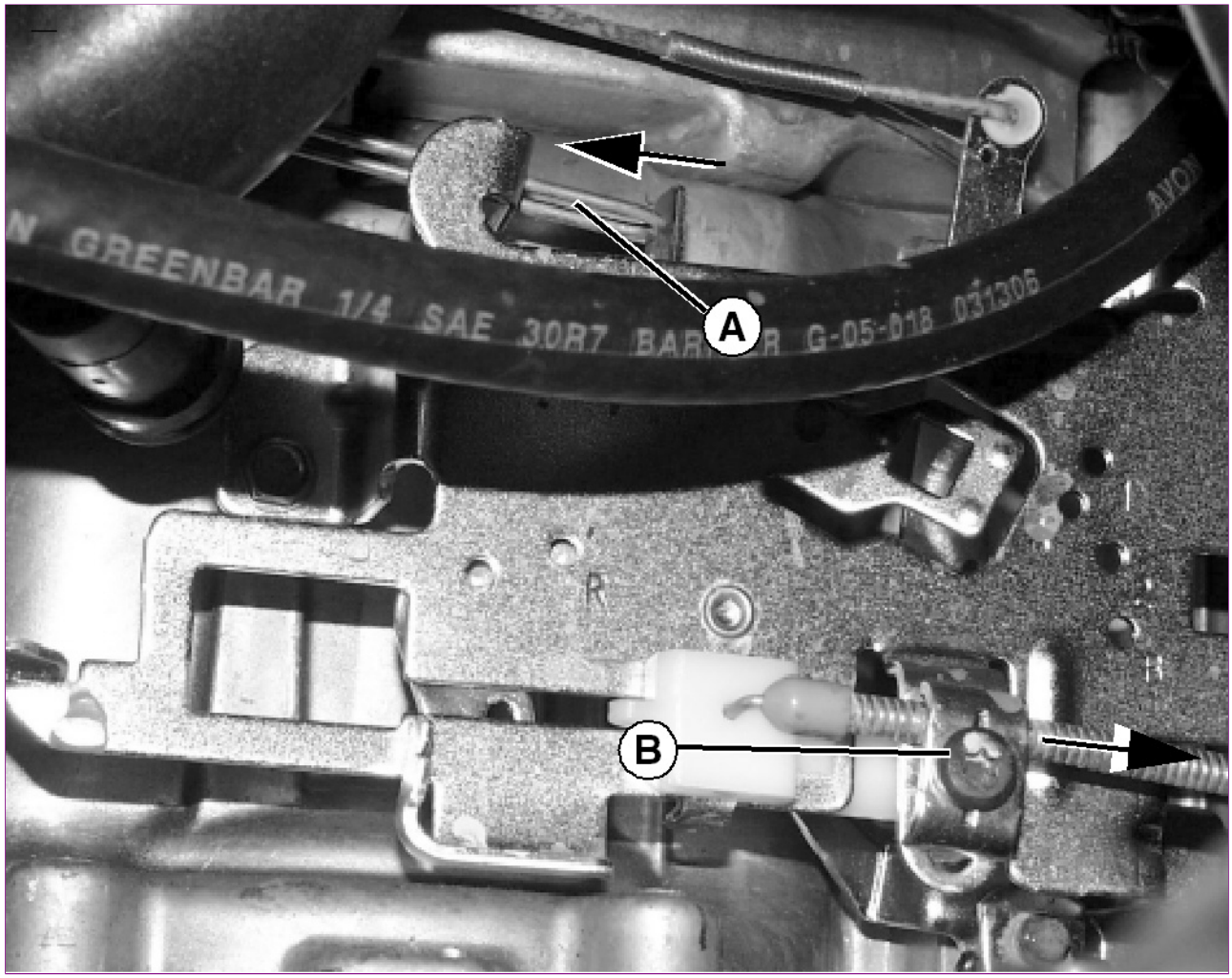
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Throttle/Choke Cable Adjustment

Throttle/Choke Cable Adjustment

Reason:

To make sure the throttle cable moves the throttle and choke through its full range of movement.

Procedure:

1. Move throttle lever all the way forward to Start (Choke) position.
2. 

Locate choke control rod (A) on right side of engine at top of throttle control plate.
3. With your fingers or a needle nose pliers, try and move choke rod (A) toward carburetor (top arrow).
4. If choke control rod moves toward carburetor, choke is not completely closing and throttle cable needs to be adjusted.
5. Loosen throttle cable clamp (B).
6. Slide the throttle cable as far as it will go to the right.
7. Tighten throttle cable clamp (B) to specification.

Item	Measurement	Specification
Specification:		
Throttle Cable Clamp		3 N•m 25 lb-in.)

Fuel Shutoff Solenoid Test

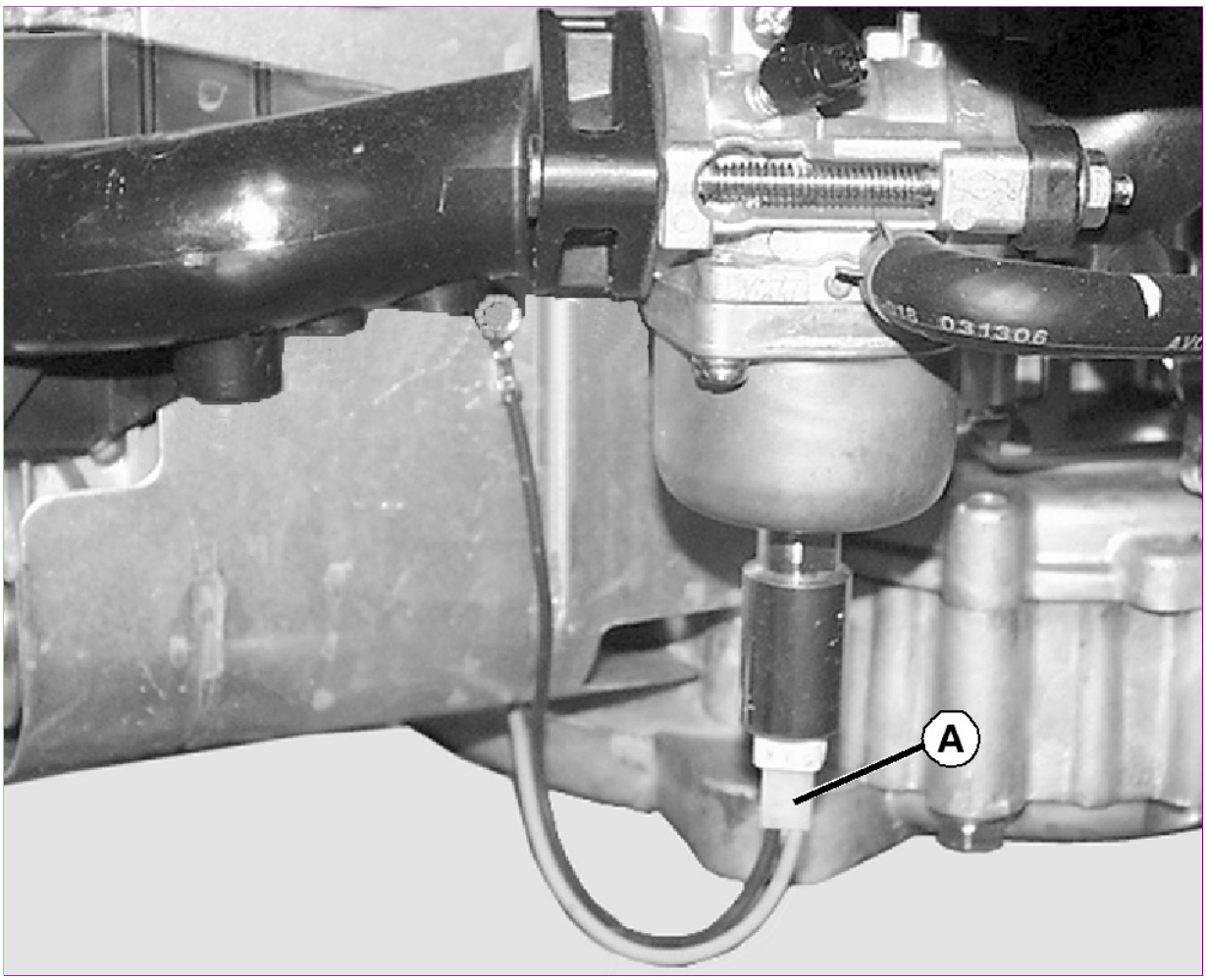
Reason:

To test proper operation of fuel shutoff solenoid.

Required Tools:

- Two Jumper wires

Procedure:

1. Park machine safely.
2. Listen for an audible click when ignition switch is turned from OFF to ON.
3. If solenoid does not click, problem could be in machine wiring. See electrical section.
4. 

Disconnect wire (A) from solenoid.
5. Place one jumper wire between one of the fuel solenoid terminals and a good ground. Place second jumper wire on battery positive terminal and momentarily touch other solenoid terminal.
6. *NOTE:*

   If battery voltage drops below 9 volts when cranking engine or while engine is running, the solenoid will not function.

   If solenoid clicks when wire contacts terminal, the solenoid is working properly.

Results:

- Solenoid is operating properly if a click is heard when ignition switched from OFF to ON.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Governor Adjustment - Static

Governor Adjustment - Static

(Engine OFF)

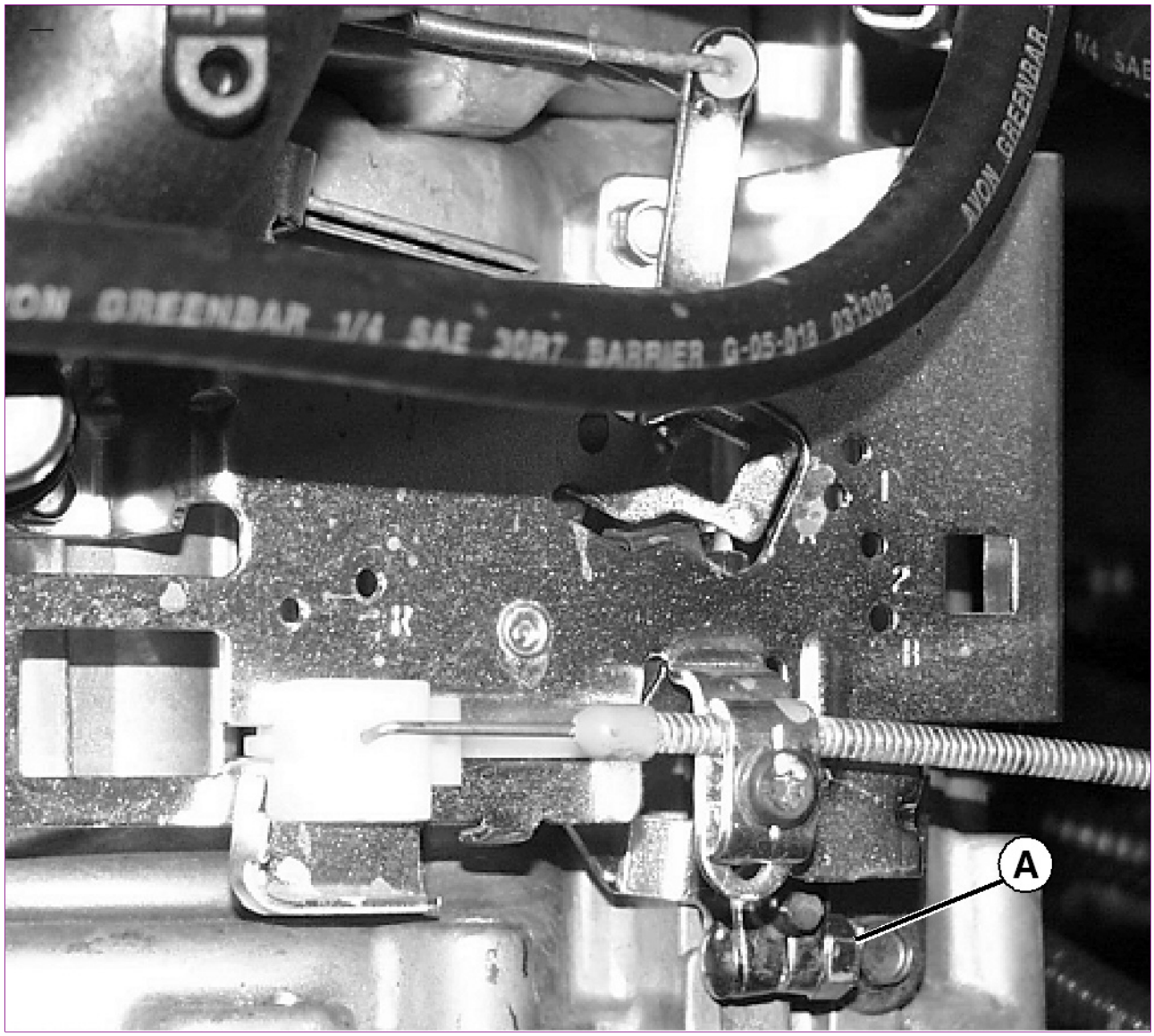
CAUTION:

Before starting or running engine, static adjustment of the governor must be made. Failure to make static adjustments first, could result in engine overspeeding, and may result in engine or equipment damage, personal injury and/or property damage.

Reason:

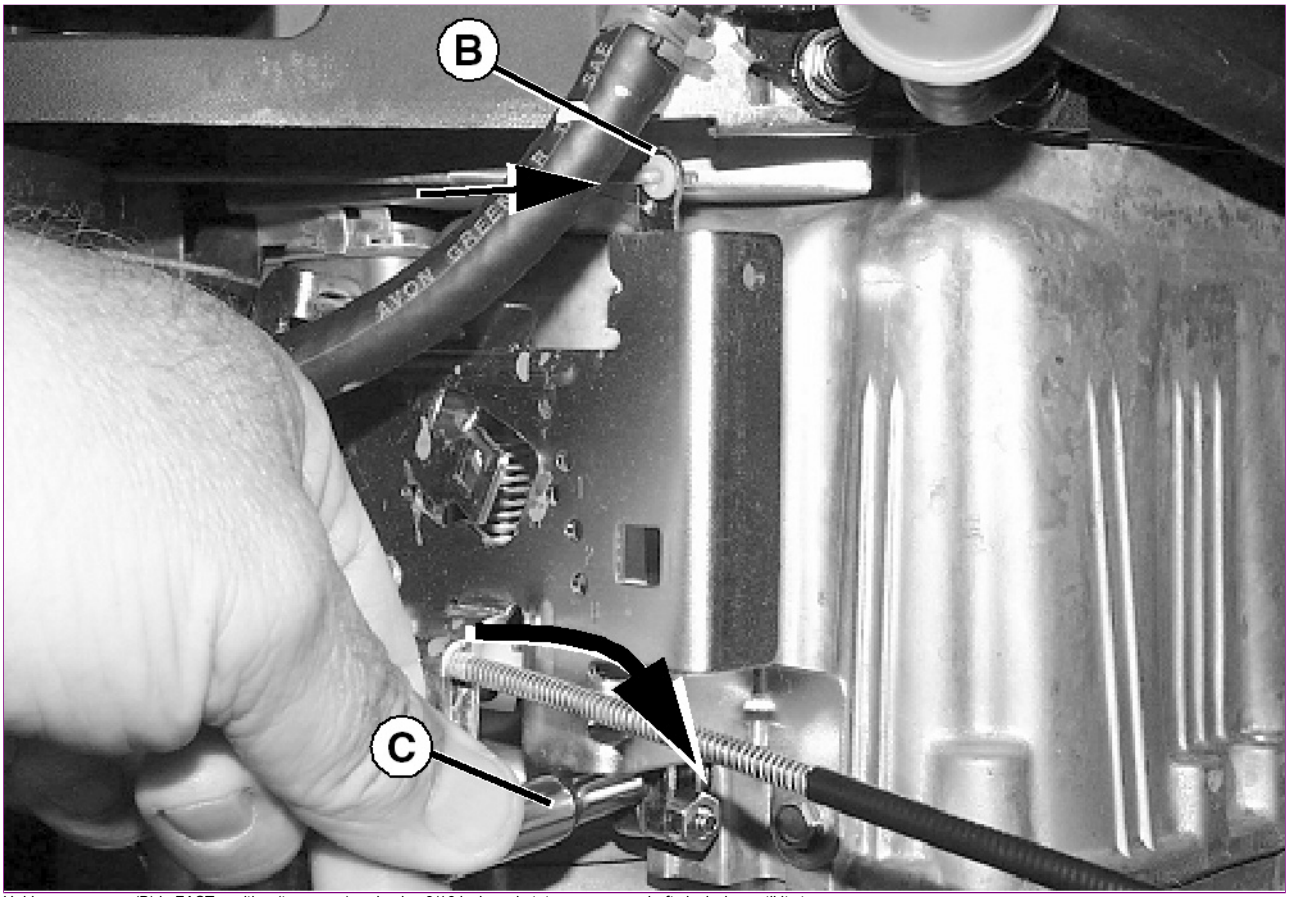
To remove any slack in governor linkage that would allow engine to overspeed.

Procedure:



1. Loosen governor lever pinch bolt nut (A).
2. Move throttle lever to FAST.
3. **IMPORTANT:**

   Do not bend governor link or distort governor arm.



Hold governor arm (B) in FAST position (top arrow) and using 3/16 inch socket, turn governor shaft clockwise until it stops.

4. Hold governor arm and shaft in position. Tighten governor arm pinch bolt nut to specification.

Item	Measurement	Specification
Specification:		
Lock Nut		4.5 N•m 40 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Governor Adjustment - Dynamic

Governor Adjustment - Dynamic

(Full Throttle - No Load)

Reason:

To verify the engine speed settings are within limits.

Equipment:

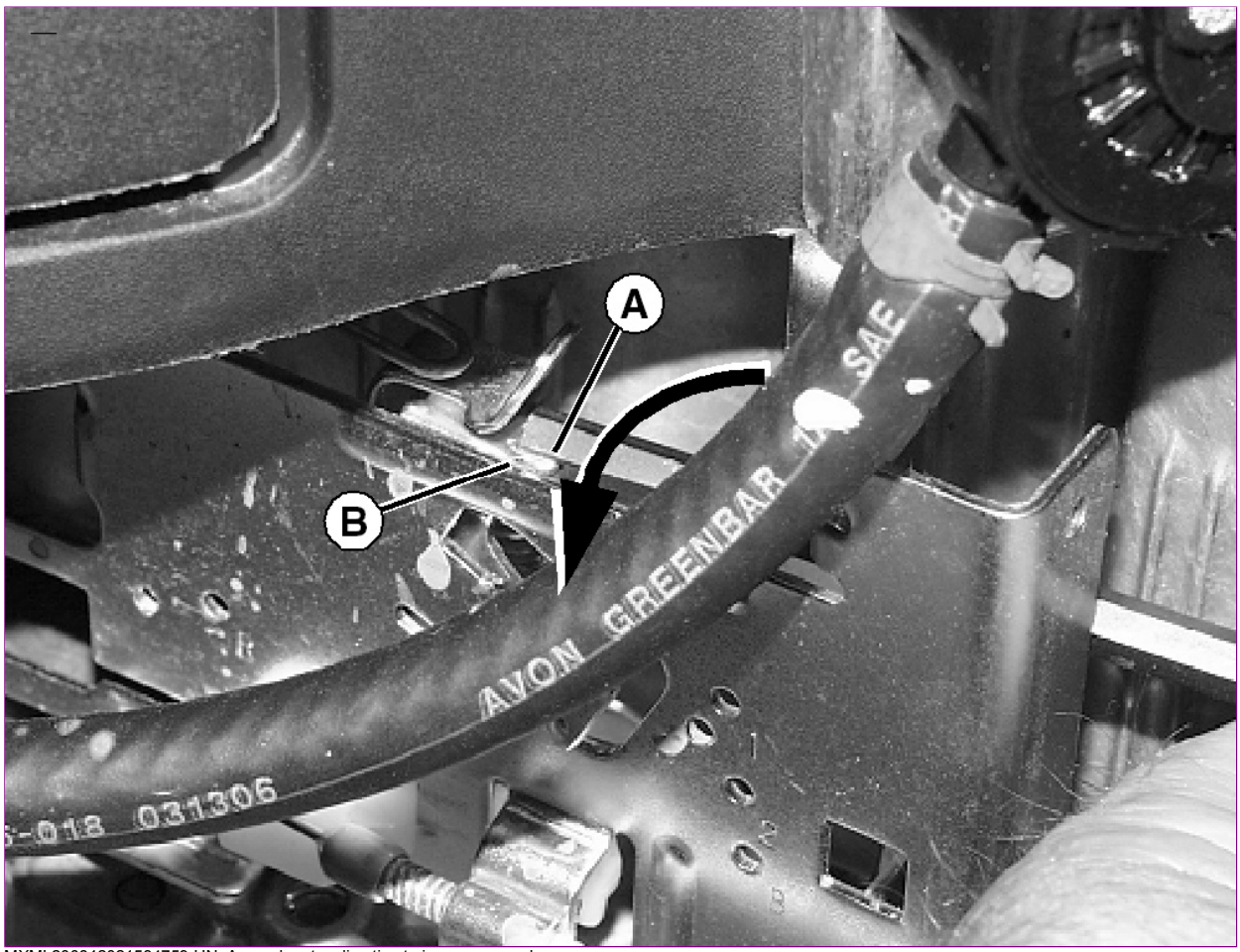
- JT07270 Pulse Tachometer, or
- JT05719 Digital Tachometer

Procedure:

CAUTION:

Before starting or running engine, static adjustment of the governor must be made. Failure to make static adjustments first, could result in engine overspeeding, and may result in engine or equipment damage, personal injury and/or property damage.

1. With engine running, set throttle lever to FAST.
2. Measure engine rpm.

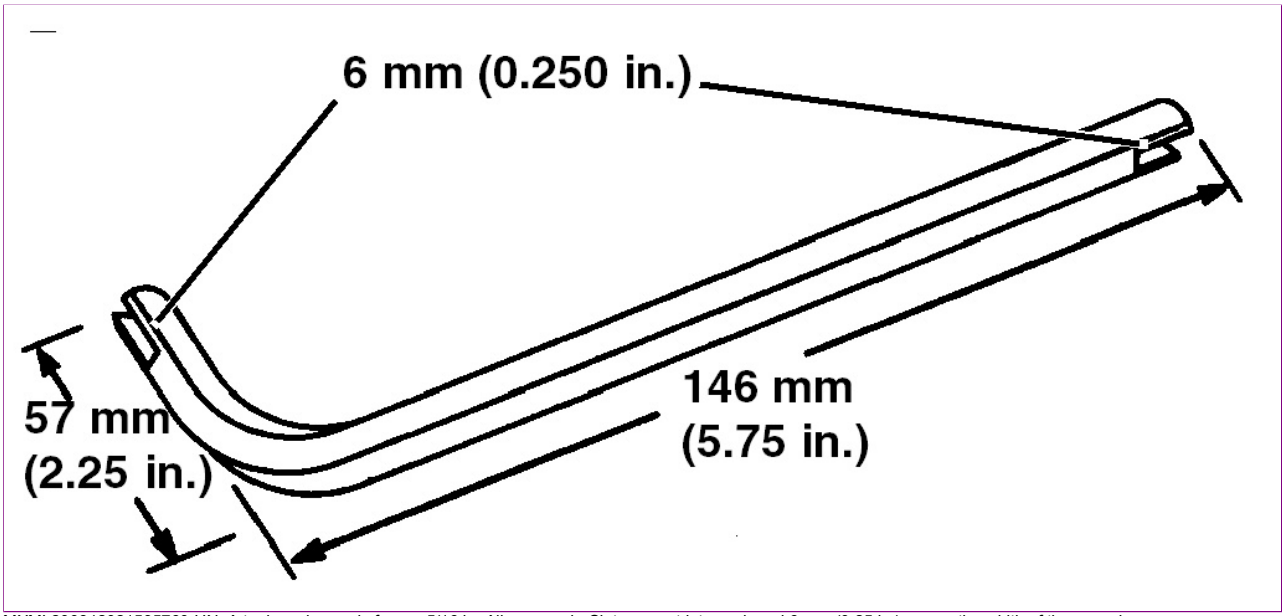


MXML200812021534759-UN: Arrow denotes direction to increase speed.

3. **IMPORTANT:**

   Do not bend governor link or distort governor arm.

   Insert the governor adjusting tool (A) and bend the upper governor spring anchor (B) to adjust the top no load engine rpm to specification.
4. Bend the anchor UP (counter clockwise) to lengthen the spring and increase the rpm, or DOWN (clockwise) to shorten the spring and reduce the engine rpm.



MXML200812021535760-UN: A tool can be made from a 5/16 in. Allen wrench. Slots are cut into each end 6 mm (0.25 in.) across the width of the wrench.

Item	Measurement	Specification
Specification:		
Top No Load rpm		3350 ± 100 rpm

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Governed Idle Adjustment

Governed Idle Adjustment

Reason:

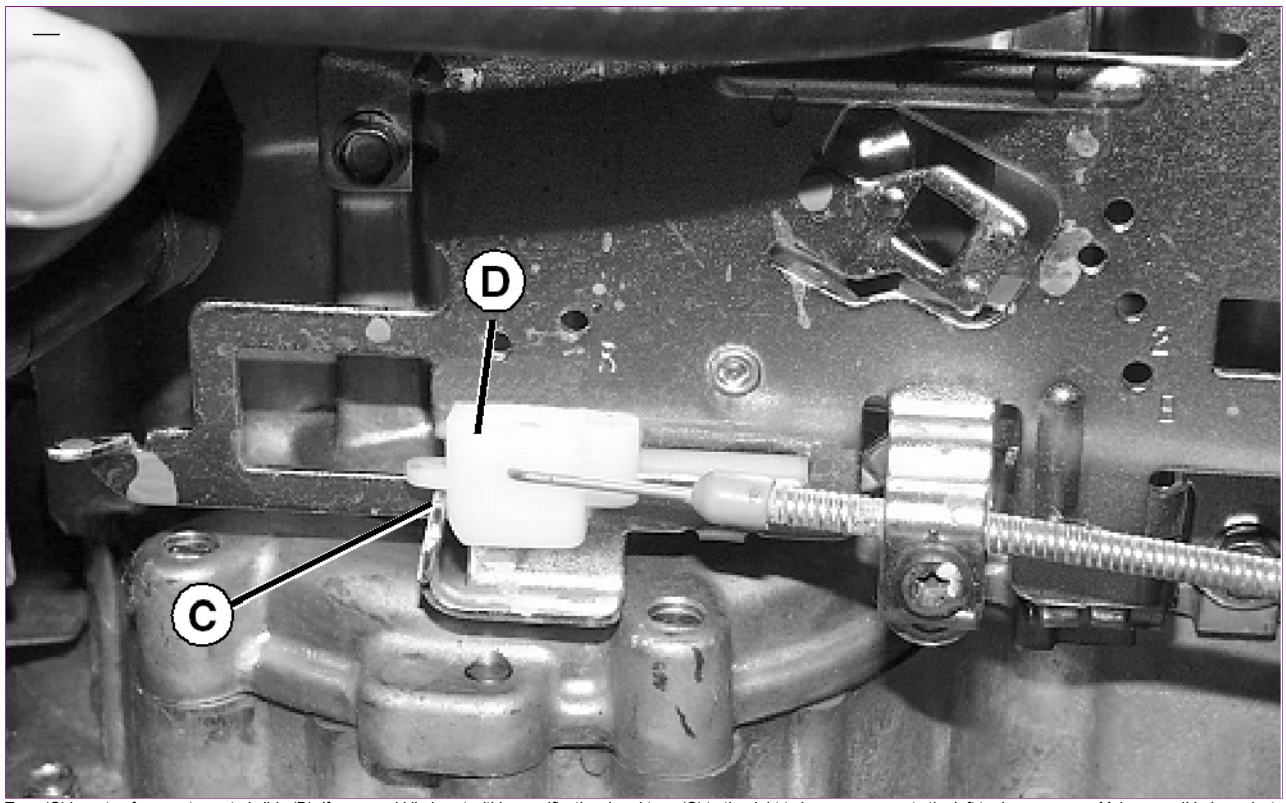
To set the governed idle speed.

Equipment:

- JT07270 Pulse Tachometer, or
- JT05719 Digital Tachometer

Procedure:

1. Start engine and run at 1/2 throttle for 5 minutes to bring engine to operating temperature.
2. Move throttle lever to slow position and check engine speed with tachometer.



3. Tang (C) is a stop for remote control slide (D). If governed idle is not within specification, bend tang (C) to the right to increase rpm or to the left to decrease rpm. Make sure slide is against tab when checking rpms.

Item	Measurement	Specification
Specification:		
Governed Idle rpm		2200 ± 300 rpm

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Slow Idle Carburetor Adjustment

Slow Idle Carburetor Adjustment

Reason:

To set the carburetor mixture screw for proper operation of the carburetor.

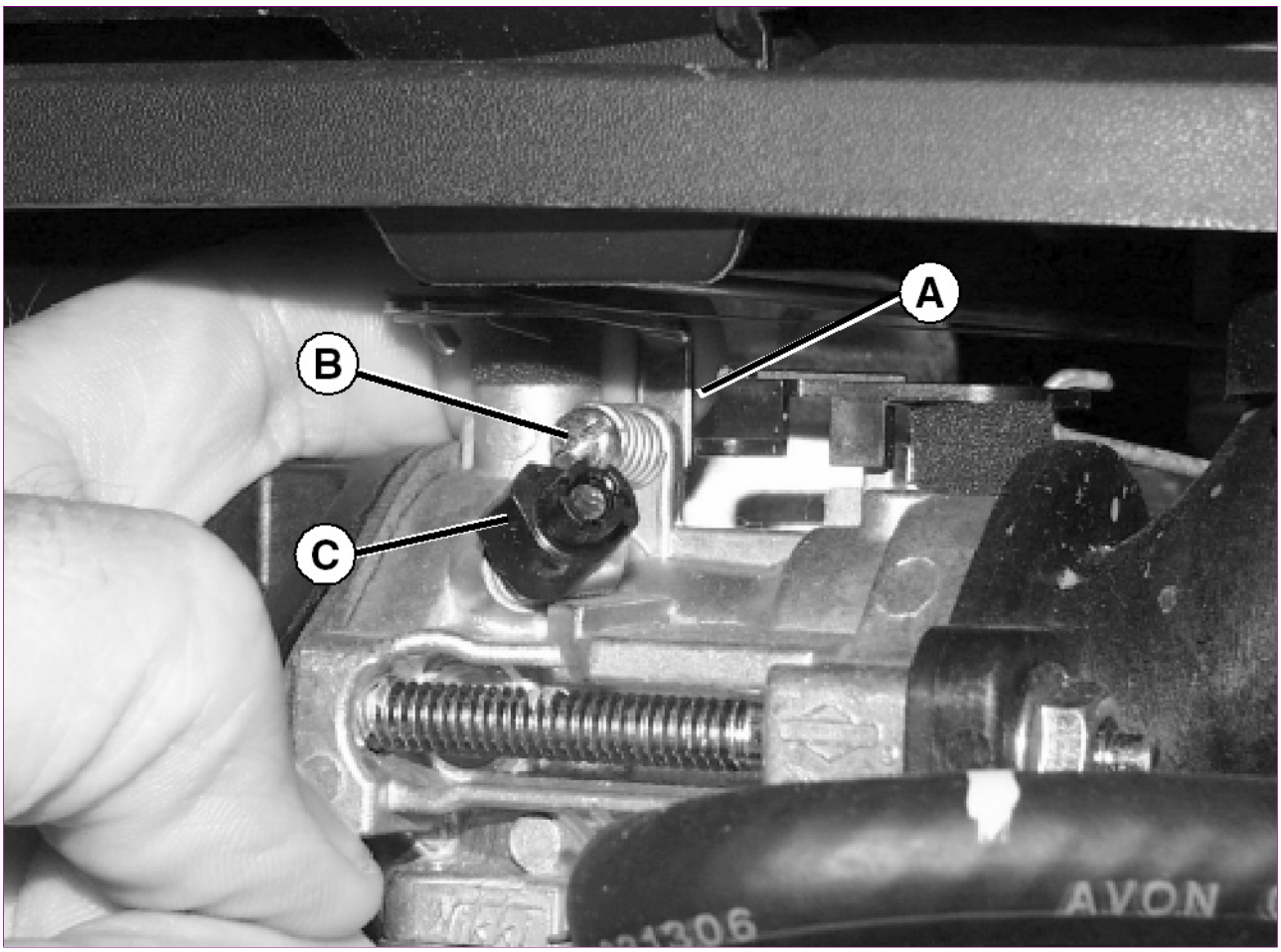
Equipment:

- JT07270 Pulse Tachometer, or
- JT05719 Digital Tachometer

IMPORTANT:

To obtain correct adjustment, the procedure must be performed in the sequence shown.

Procedure:

1. Start engine. Run at 1/2 throttle for 5 minutes to bring engine to operating temperature.
2. Move throttle to SLOW.
3. 

   CAUTION:

   Touching hot surfaces can burn skin. The engine, components, and fluids will be hot if the engine has been running. Keep hands and body away from hot surfaces when servicing or working near the engine and components. Allow engine to cool.

   Hold throttle closed so that tab (A) is against idle speed screw (B). Turn idle speed screw (B) to obtain 1750 rpm.
4. Adjust idle mixture screw (C) slowly until best idle is obtained.
5. Check rpms and re adjust if necessary.

Item	Measurement	Specification
Specification:		
Carburetor Slow Idle Speed		1750 ± 50 rpm

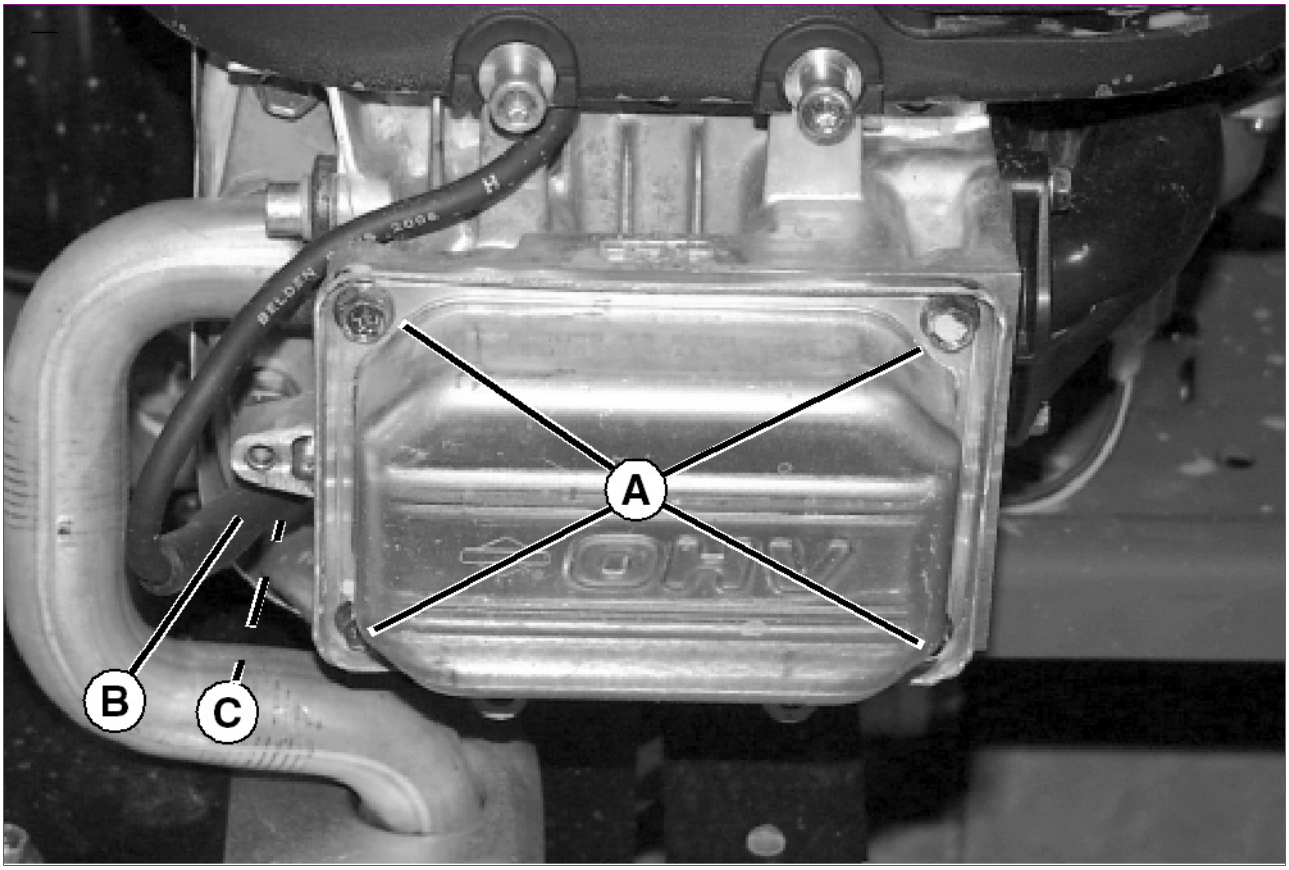
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Valve Clearance Adjustment

Valve Clearance Adjustment

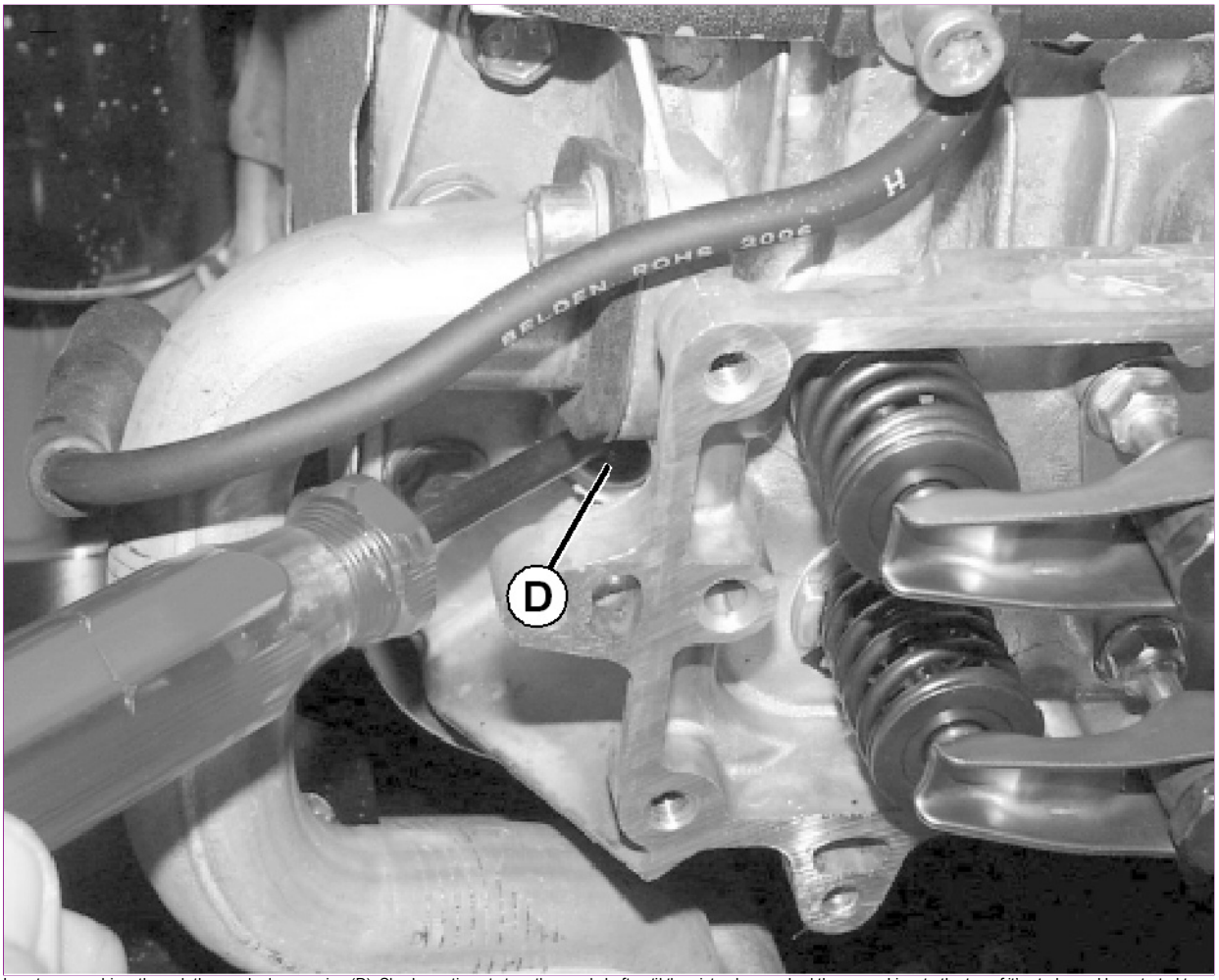
NOTE:

Correct position of crankshaft is necessary to eliminate interference by the compression release mechanism when adjusting valve clearance.

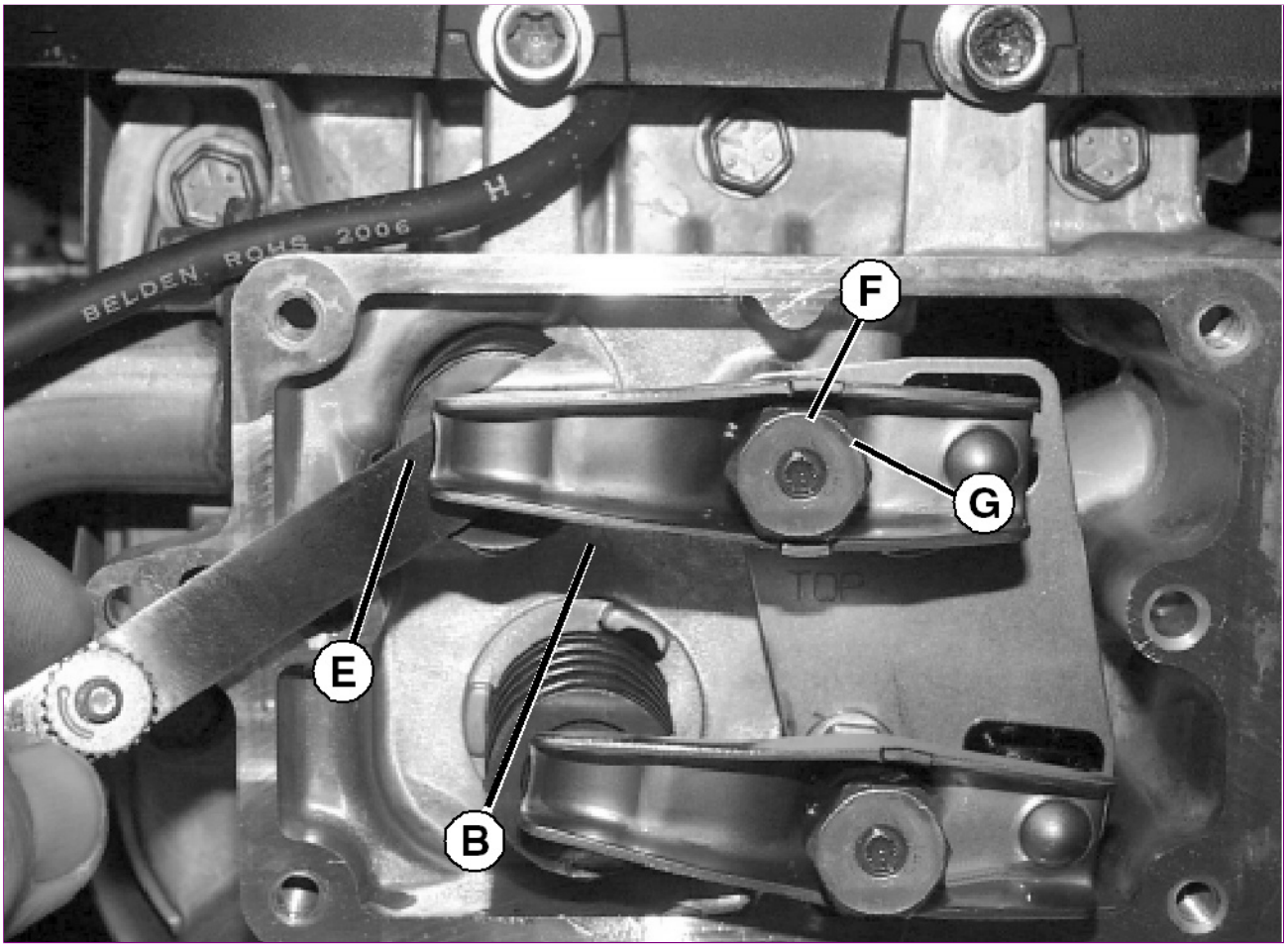
Procedure:

1. Park machine safely and allow engine to cool.
2. 

Remove four bolts and valve cover (A).
3. Disconnect spark plug wire (B) and remove spark plug (C).
4. Place thumb or finger over spark plug hole and turn crankshaft (clockwise viewed from top, counter clockwise viewed from bottom) until air pressure is felt in spark plug hole (engine is on compression stroke).



5. Insert a screwdriver through the spark plug opening (D). Slowly continue to turn the crankshaft until the piston has pushed the screwdriver to the top of it's stroke and has started to move down again approximately **6.35 mm (0.25 in.)** .



6. Check valve clearance with a feeler gauge (E) between valve stem and rocker arm. Valve clearance should be **0.08 - 0.13 mm (0.003 - 0.005 in.)** for the intake (bottom) valve, and **0.13 - 0.18 mm (0.005 - 0.007 in.)** for the exhaust (top) valve.
7. If not within specification, adjust as necessary by loosening set screw (F) and adjusting nut (G) until slight drag is felt on feeler gauge. Hold nut with wrench and tighten set screw to **7 N•m (60 lb-in.)** .
8. Recheck clearance and make adjustments if necessary.
9. Install spark plug. Tighten to specification.
10. Install valve cover with new gasket. Tighten screws to specification.

Item	Measurement	Specification
Specifications:		
Lock Nut		7 N•m 60 lb - in.)
Valve Clearance Intake		0.08 - 0.13 mm 0.003 - 0.005 in.)
Exhaust		0.13 - 0.18 mm 0.005 - 0.007 in.)
Valve Cover Cap Screws		7 N•m 60 lb - in.)
Spark Plug Torque		20 N•m 180 lb - in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Armature Air Gap Adjustment

Armature Air Gap Adjustment

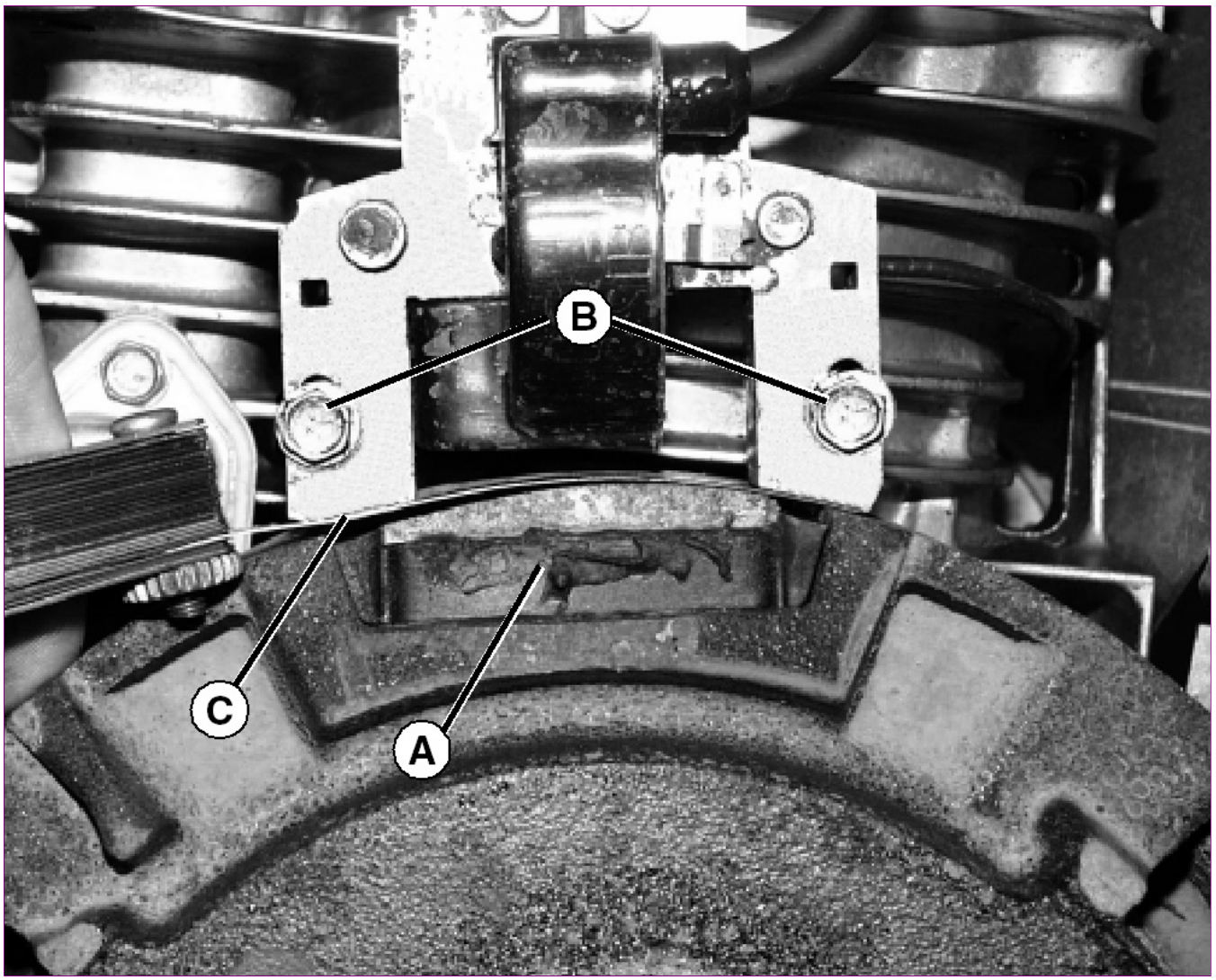
Reason:

To set the ignition air gap for proper operation.

Equipment:

- 0.30 mm (0.012 in.) Thickness Gauge

Procedure:



1. Remove blower housing.
2. Rotate flywheel until magnet (A) is away from armature.
3. Loosen the armature mounting screws (B). Slide armature away from flywheel as far as possible.
4. Tighten one screw enough to hold the armature in place.
5. Rotate flywheel until magnet is directly under armature.
6. Place a **0.30 mm (0.012 in.)** thickness gauge (C) between armature and magnet.
7. Loosen the mounting screw so magnet will pull armature against thickness gauge.
8. Tighten both mounting screws (B) to specification.
9. Rotate flywheel while pulling thickness gauge out from between the armature and the magnet.

Item	Measurement	Specification
Specification:		

Armature Air Gap	0.25 - 0.35 mm 0.010 - 0.014 in.)
Armature Mounting Screws	2.8 N•m 25 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Crankcase Vacuum Test

Crankcase Vacuum Test

Reason:

To determine operation of breather, condition of seals, gaskets, rings, piston, and cylinder wall.

Equipment:

- JTO3503 Vacuum Gauge
- JTO5703 Barb Fitting
- JTO5699 Line
- 8741-F66 Plug

Procedure:

1. Park machine safely
2. Raise hood and remove oil dipstick.
3. Place plug and barbed fitting in dipstick tube until tight.
4. Cover barbed fitting with a plug or finger and start engine.
5. Quickly remove plug or finger from barbed fitting and attach hose and gauge.
6. Run engine at fast idle and record reading on gauge.
7. Run engine at slow idle. Do not turn engine off.
8. Disconnect hose and quickly place plug or finger over barbed fitting.
9. Turn engine off.
10. Remove plug and install oil dipstick.

Results:

If crankcase vacuum is less than specification, check:

- breather reed valve clearance and condition.
- seals and gaskets for leakage.
- valve cover gasket for leakage.
- rings, piston and cylinder wall for wear or damage.
- valve and valve seats for wear or damage.
- head warp.

Item	Measurement	Specification
Crankcase Vacuum (minimum):		
Water Movement		25.4 cm 10 in.)
Hg (mercury) Movement		18.7 mm 0.74 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Leakdown Test

Cylinder Leakdown Test

Reason:

To check sealing of piston rings and cylinder bore.

Equipment:

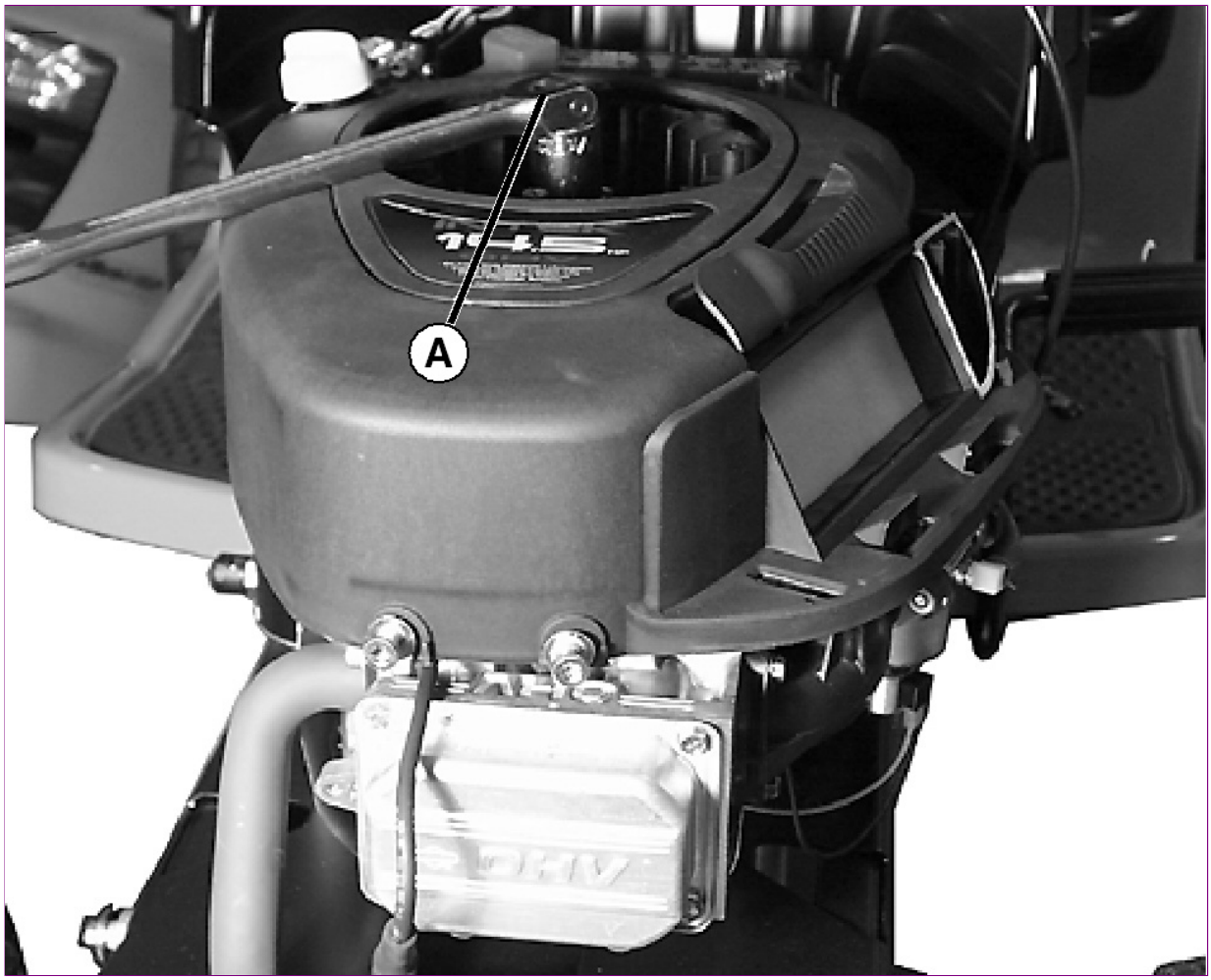
- JTO3502 Cylinder Leak Tester

Procedure:

1. Remove hood assembly. See Hood Removal and Installation in the Miscellaneous section.
2.

CAUTION:

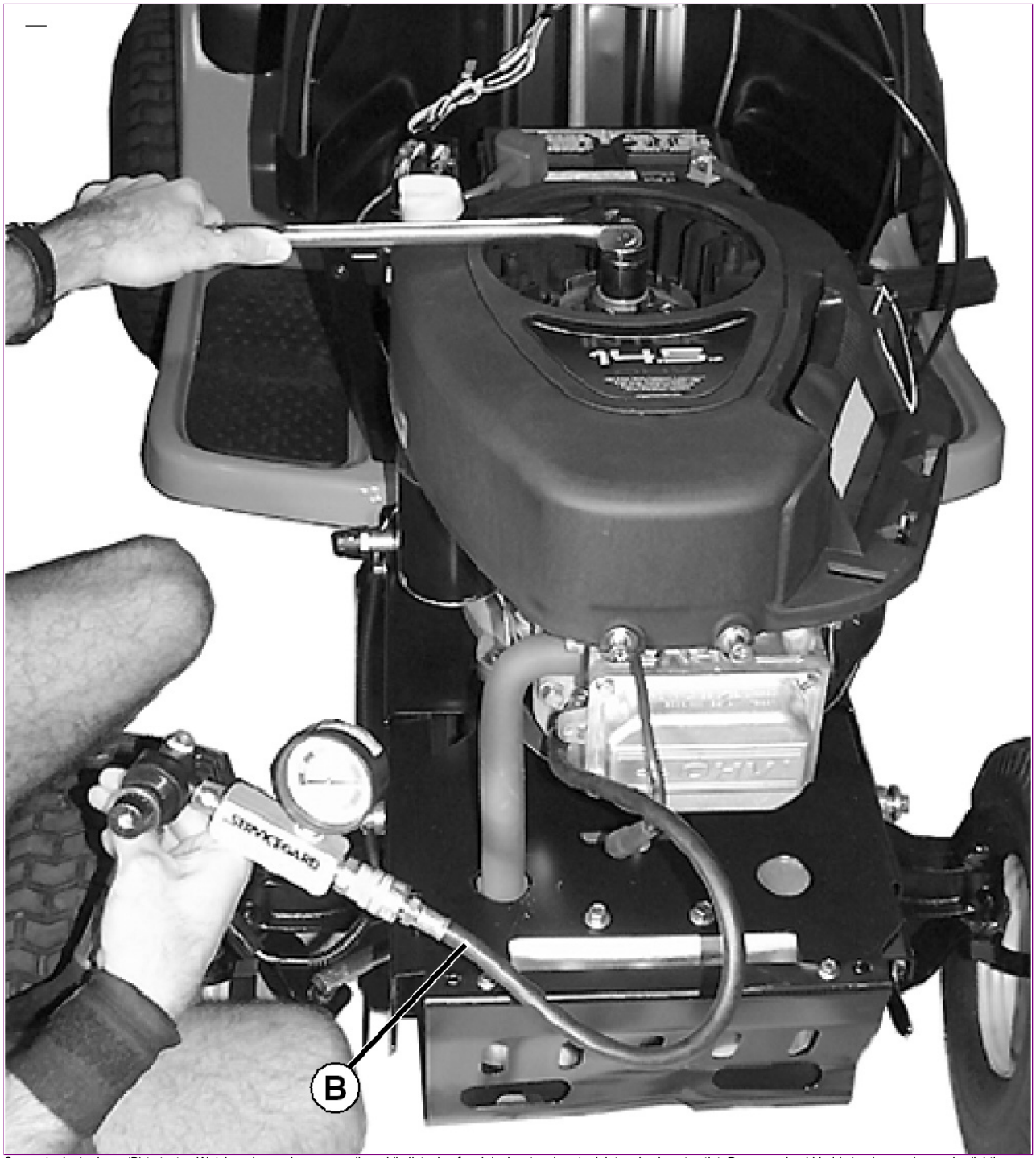
Touching hot surfaces can burn skin. The engine, components, and fluids will be hot if the engine has been running. Keep hands and body away from hot surfaces when servicing or working near the engine and components. Allow engine to cool.

Warm engine to operating temperature, then stop engine.
3. Move transaxle shift lever to NEUTRAL. Lock park brake.
4. 

Remove the flywheel screen. Use a socket with a breaker bar (A) on the flywheel nut to hold the flywheel in position when performing the test.
5.

CAUTION:

Before attaching adapter hose to tester, make sure another person is holding on tight to the breaker bar and the engine is at TDC. When compressed air is applied, there will be considerable torque forcing piston and crankshaft to turn.



Connect adapter hose (B) to tester. Watch and record gauge reading while listening for air leaks at carburetor inlet and exhaust outlet. Pressure should hold steady or reduce only slightly.

6. Remove test equipment and install spark plug. Tighten spark plug to **20 N•m (180 lb-in.)** .
7. Install hood.

Results:

- *NOTE:*

  A small amount of air escaping from the crankcase breather is normal.

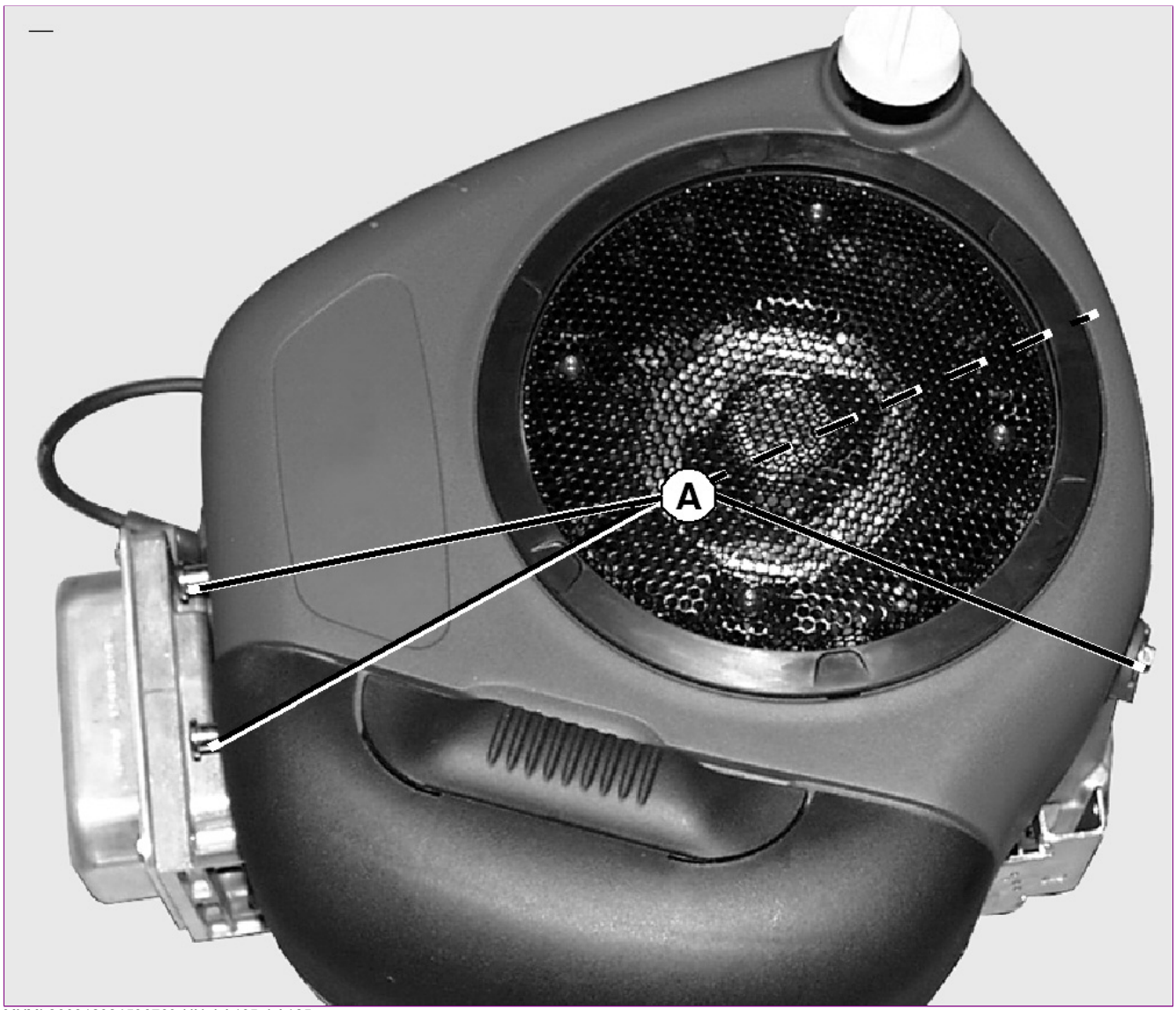
Excessive air escaping from the crankcase breather indicates worn piston rings or cylinder wall, or a leaking head gasket.

- Air escaping from the carburetor indicates a worn intake valve or seat.
- Air escaping from the exhaust pipe indicates a worn exhaust valve or seat.
- Gauge reading in the Green (low) area indicates good compression. (Less than 25% is considered normal.)
- Gauge reading in the Yellow (moderate) area indicates borderline compression. The engine is still usable but an overhaul should be considered.
- Gauge reading in the Red (high) area indicates excessive compression loss. Engine overhaul is necessary.

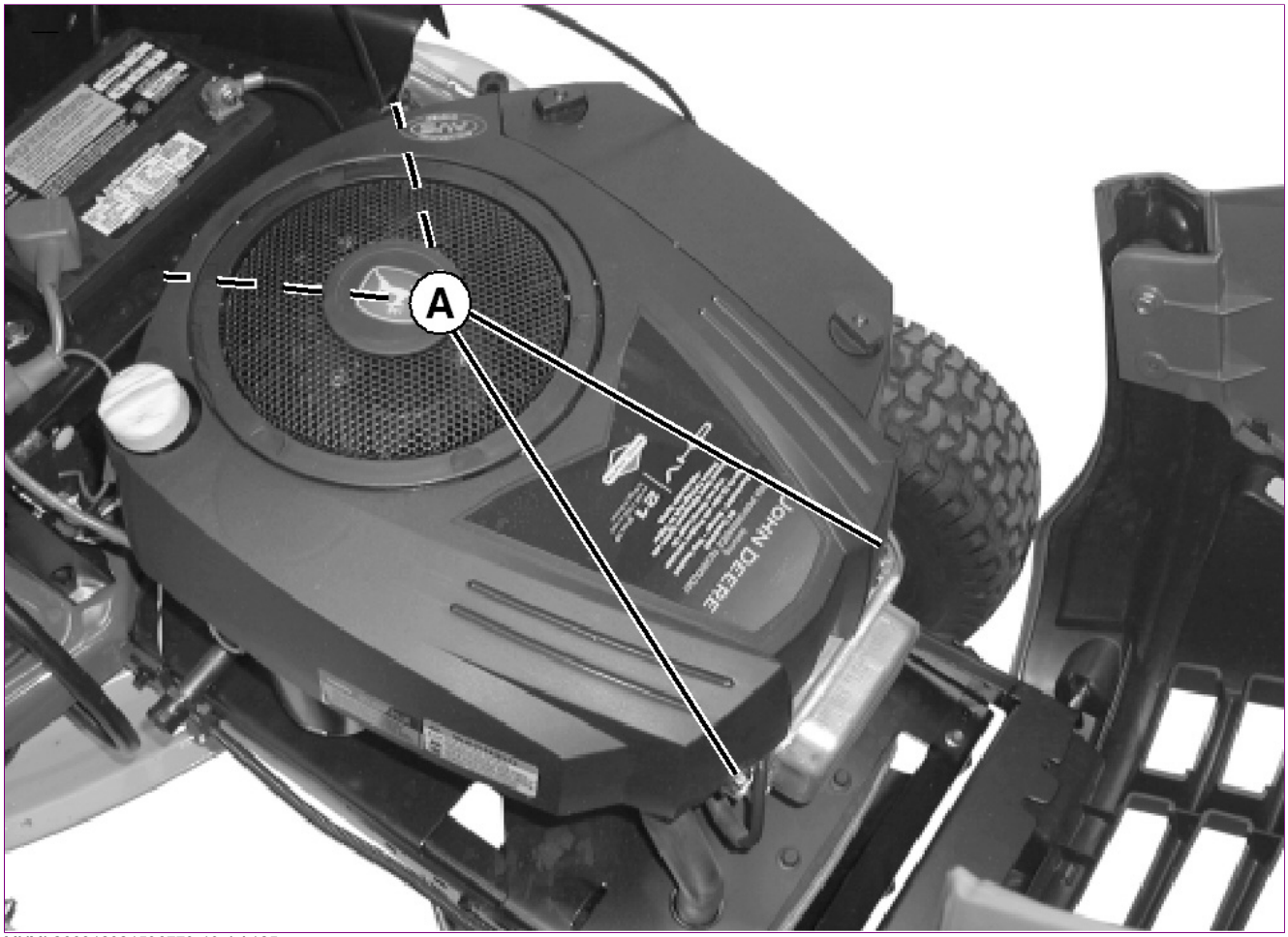
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Upper Blower Housing Removal and Installation

Upper Blower Housing Removal and Installation

Procedure:



MXML200812021536769-UN: LA105, LA125



MXML200812021536770-19: LA125

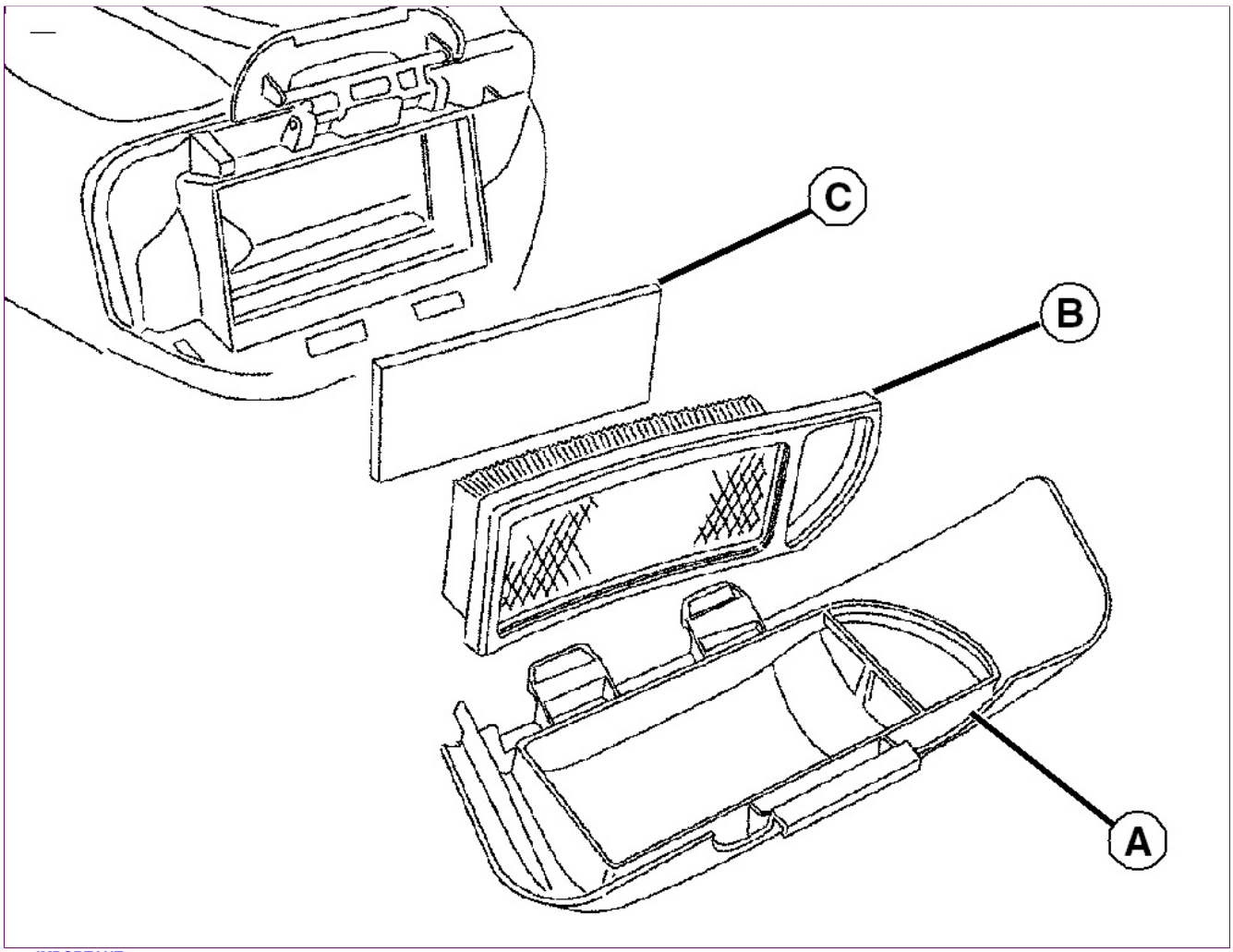
1. Remove four screws (A) holding the outer blower housing in place.
2. Lift outer blower housing up and off of engine.
3. Remove the screw holding the dipstick tube in place.
4. Install in reverse order of removal.

Item	Measurement	Specification
Specification:		
Blower Housing Screws		10 N•m 85 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Air Cleaner Service

Air Cleaner Service

Procedure for Flat Filter:

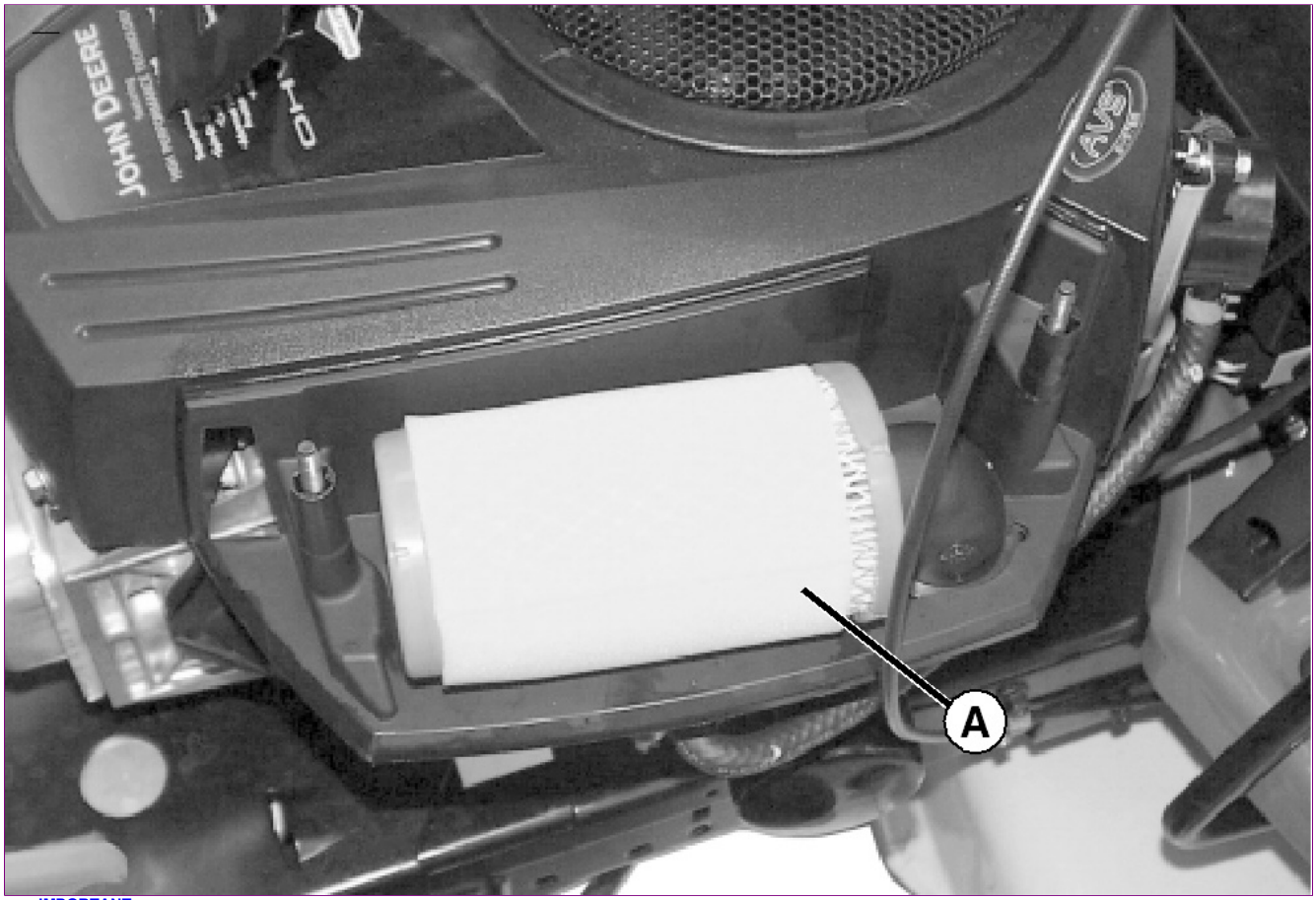


IMPORTANT:

DO NOT use petroleum solvents, such as kerosene, to clean paper cartridge. They may cause cartridge to deteriorate. DO NOT oil paper cartridge. DO NOT use pressurized air to clean or dry paper cartridge.

1. Remove cover (A) to service dual element air cleaner.
2. Remove cartridge (B) and foam pre-cleaner (C).
3. Wash pre-cleaner in liquid detergent and water and squeeze it dry in a clean cloth. Saturate it in engine oil. Wrap it in a clean absorbent cloth and squeeze to remove excess oil.
4. Clean cartridge by tapping gently on a flat surface. Replace if dirty.
5. Reinstall pre-cleaner, cartridge, and cover.

Procedure for High Flow Filter:



IMPORTANT:

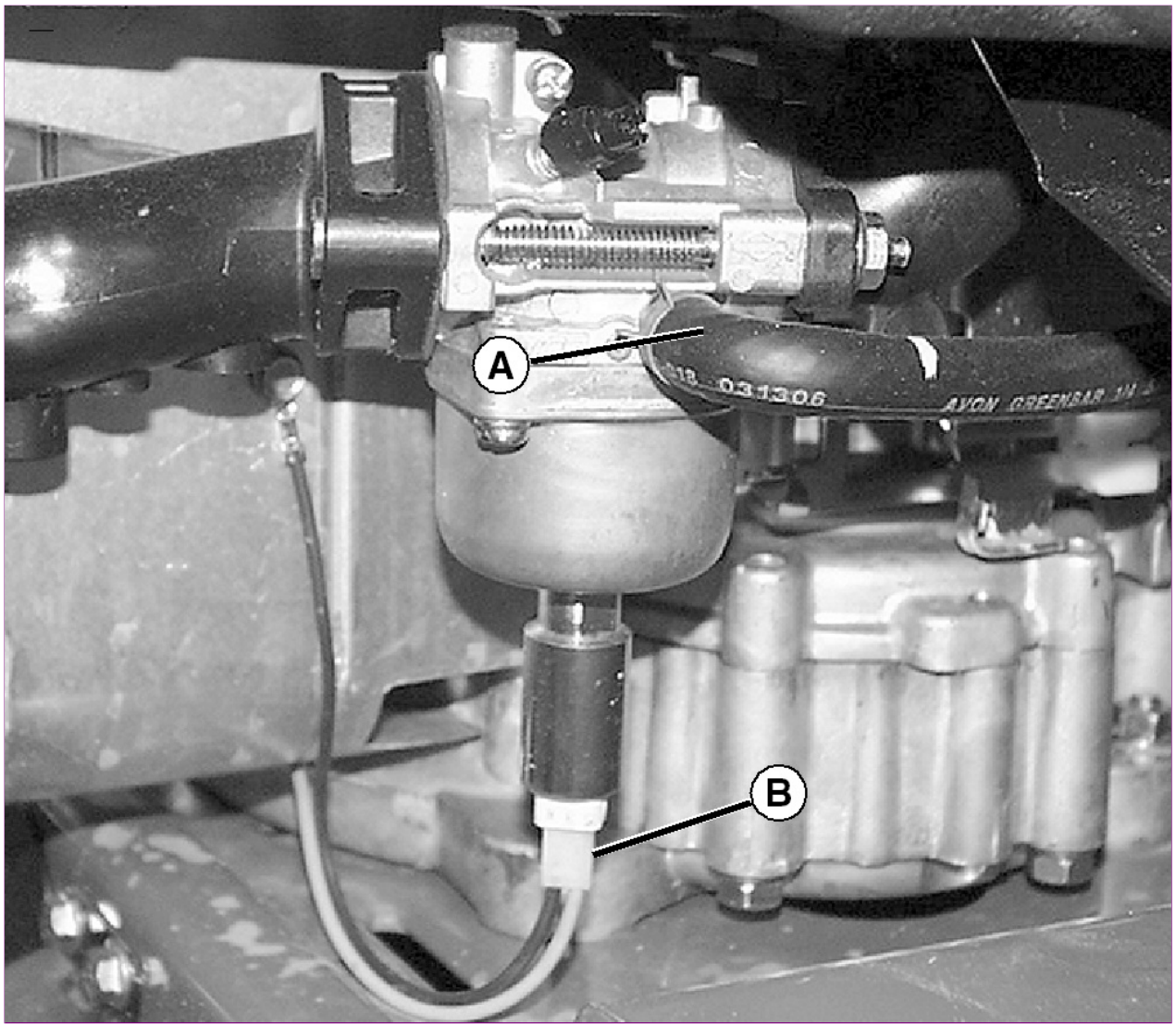
DO NOT use petroleum solvents, such as kerosene, to clean filter. DO NOT use pressurized air to clean or dry filter. DO NOT dry with heat.

1. Remove cover to service high flow air cleaner (A).
2. Pull air cleaner from intake tube.
3. Remove as much dirt as possible.
4. Wash foam filter in mild detergent and water.
5. Allow the filter to dry completely.
6. Reinstall filter.

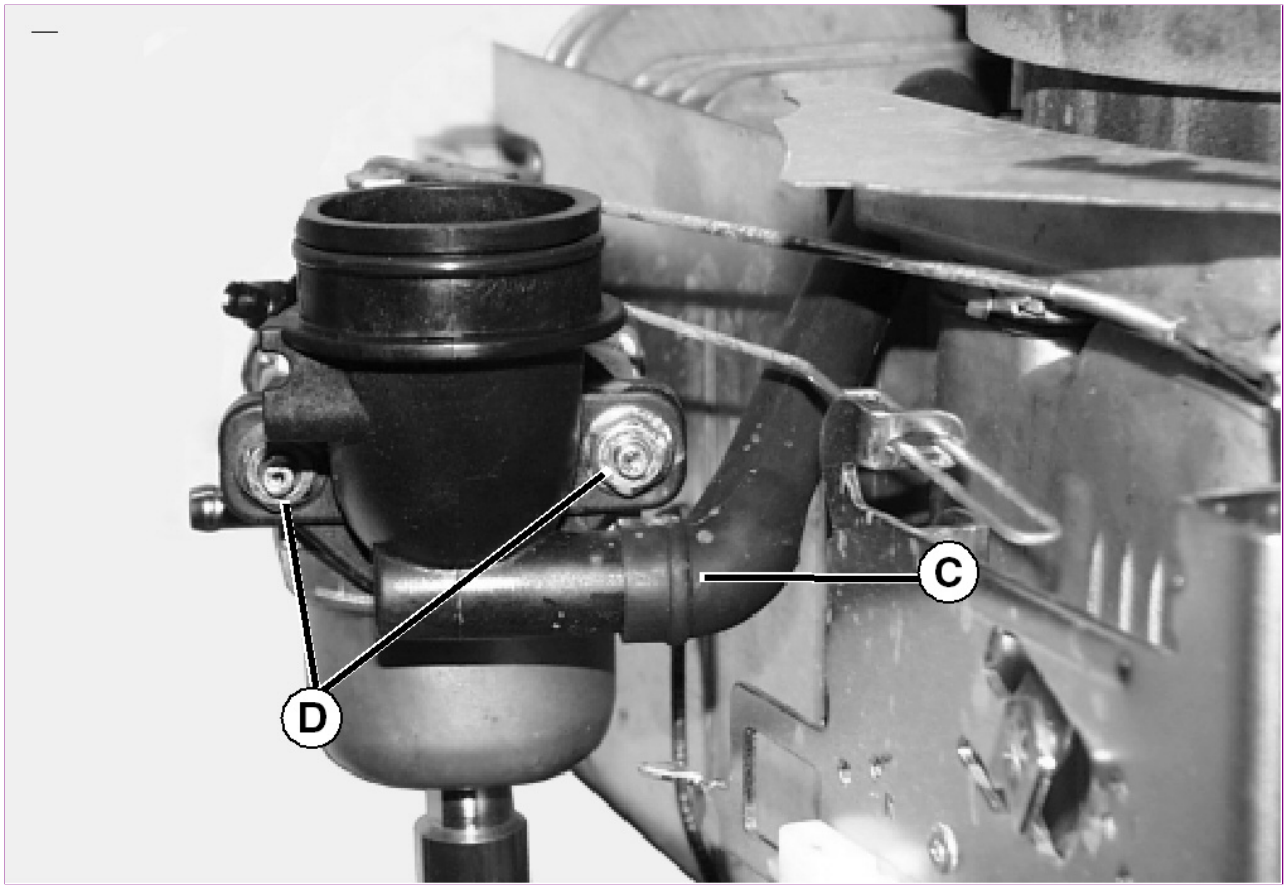
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Carburetor Removal and Installation

Carburetor Removal and Installation

Removal:

1. Park machine safely.
2. 

Disconnect fuel line (A) and drain fuel in line into an approved container.
3. Disconnect wires (B) to fuel shutoff solenoid.
4. Remove blower housing and air cleaner assembly. See Upper Blower Housing Removal and Installation

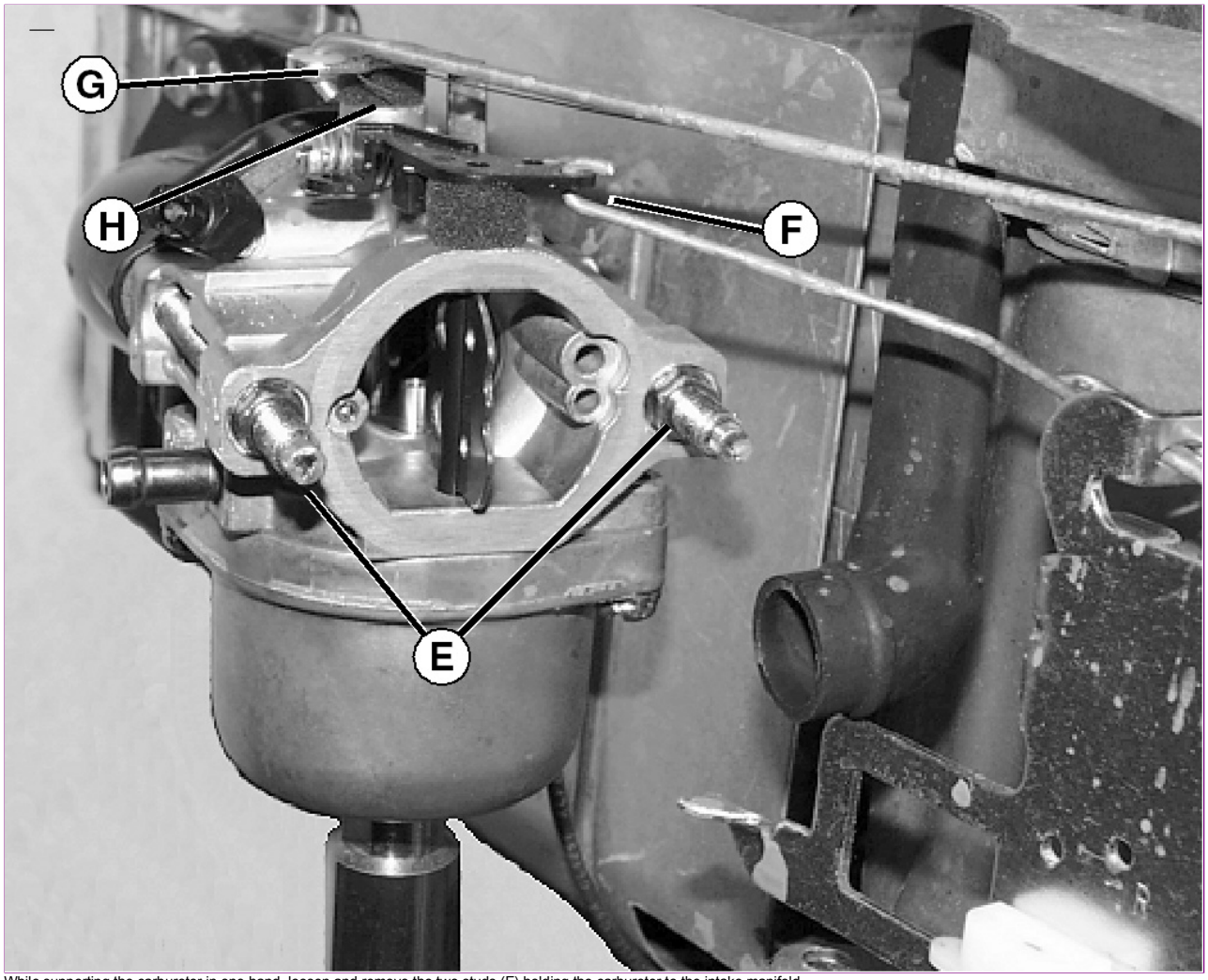
5. 

Disconnect the breather tube (C). Remove two nuts (D) securing the air cleaner base.

6. ***CAUTION:***

Fuel vapors are explosive and flammable:

- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Shut off engine before servicing.***
- ***Cool engine before servicing.***
- ***Work in a well-ventilated area.***
- ***Clean up spilled fuel immediately.***



While supporting the carburetor in one hand, loosen and remove the two studs (E) holding the carburetor to the intake manifold.

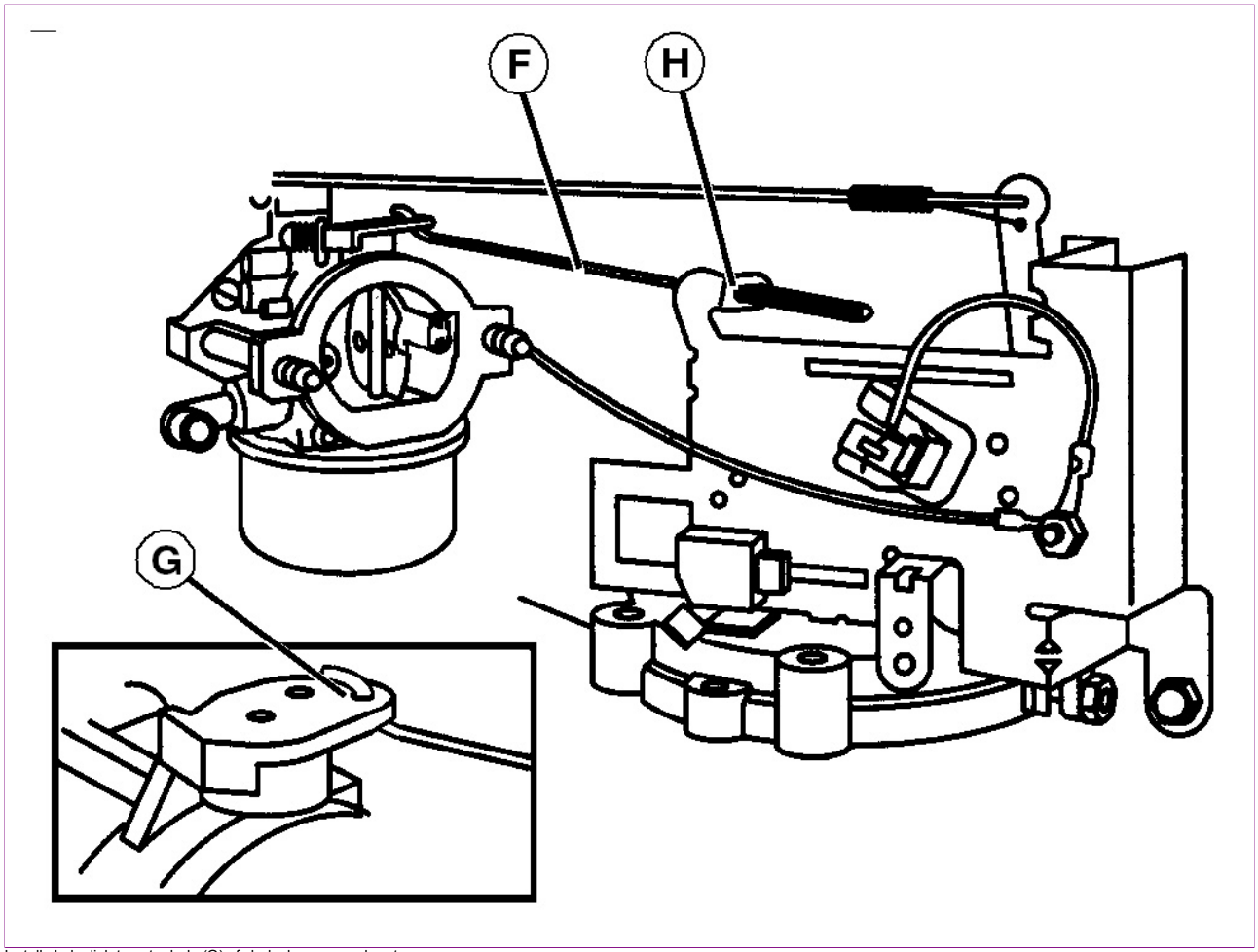
7. Carefully pull the carburetor away from the intake manifold and rotate the carburetor to disengage the choke linkage (F), governor link (G) and governor link spring (H).
8. Remove carburetor and gasket.

Installation:

CAUTION:

Before starting or running engine, static adjustment of the governor must be made. Failure to make static adjustments first, could result in engine overspeeding, and may result in engine or equipment damage, personal injury and/or property damage.

1. Connect governor link and governor link spring to throttle lever.



2. Install choke link to outer hole (G) of choke lever on carburetor.
3. Position gasket in place on the carburetor and slide choke link (F) into slot (H) in choke control bracket.
4. Making certain that the gasket is in place, install the carburetor bolts and tighten to specification.
5. **IMPORTANT:**

   Be sure breather tube is not kinked and that it is installed onto nipple as far as possible.

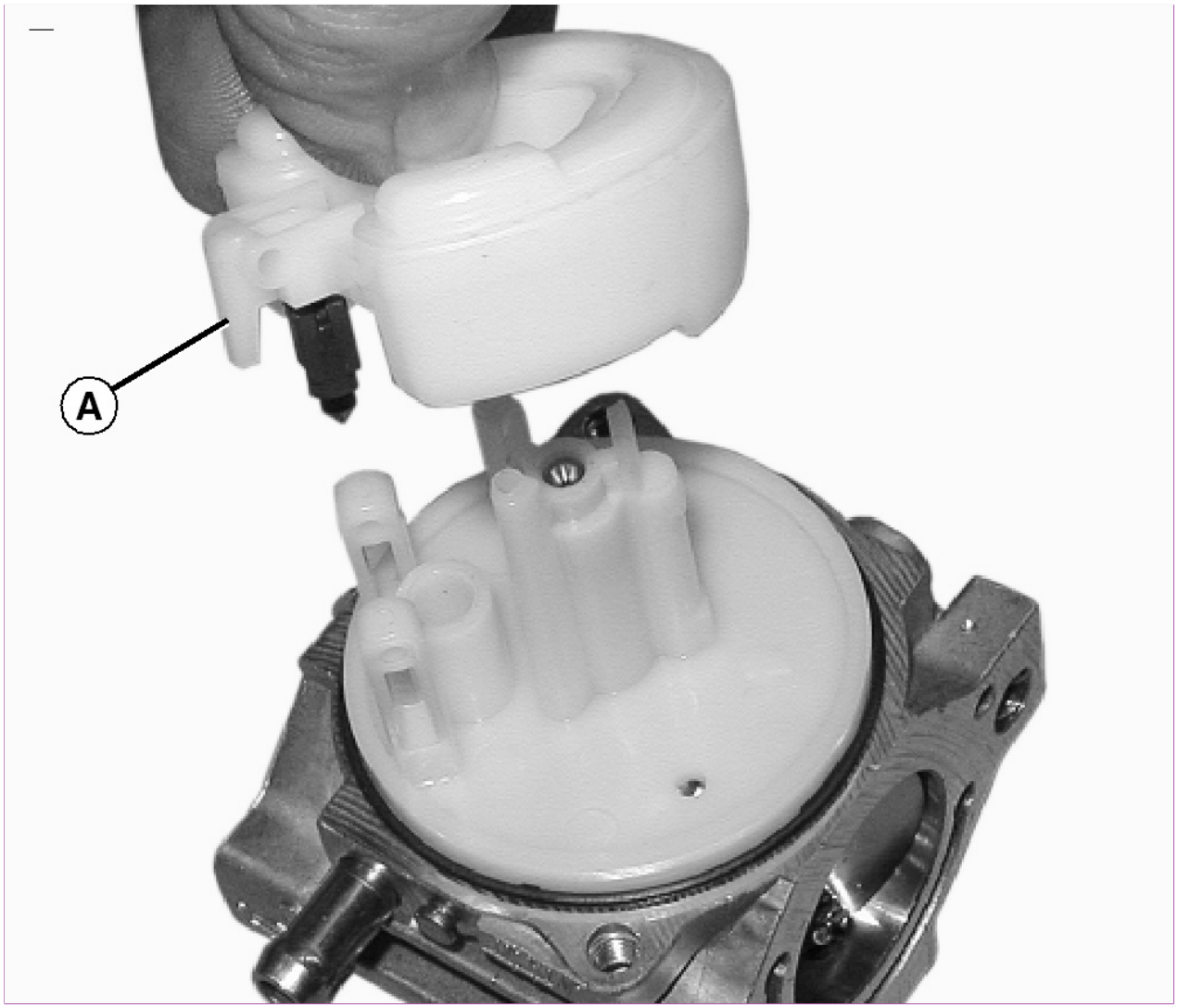
   Install the air cleaner base and breather tube. Tighten the base screw and the two nuts to specification.
6. Install air cleaner base support bracket and tighten to specification.
7. Install fuel line and fuel line clamp.
8. Install air cleaner pre-cleaner, air filter, and cover.

Item	Measurement	Specification
Specifications:		
Carburetor Mounting Studs		8 N•m 70 lb-in.)
Carburetor to Air Cleaner Elbow		4.5 N•m 40 lb-in.)

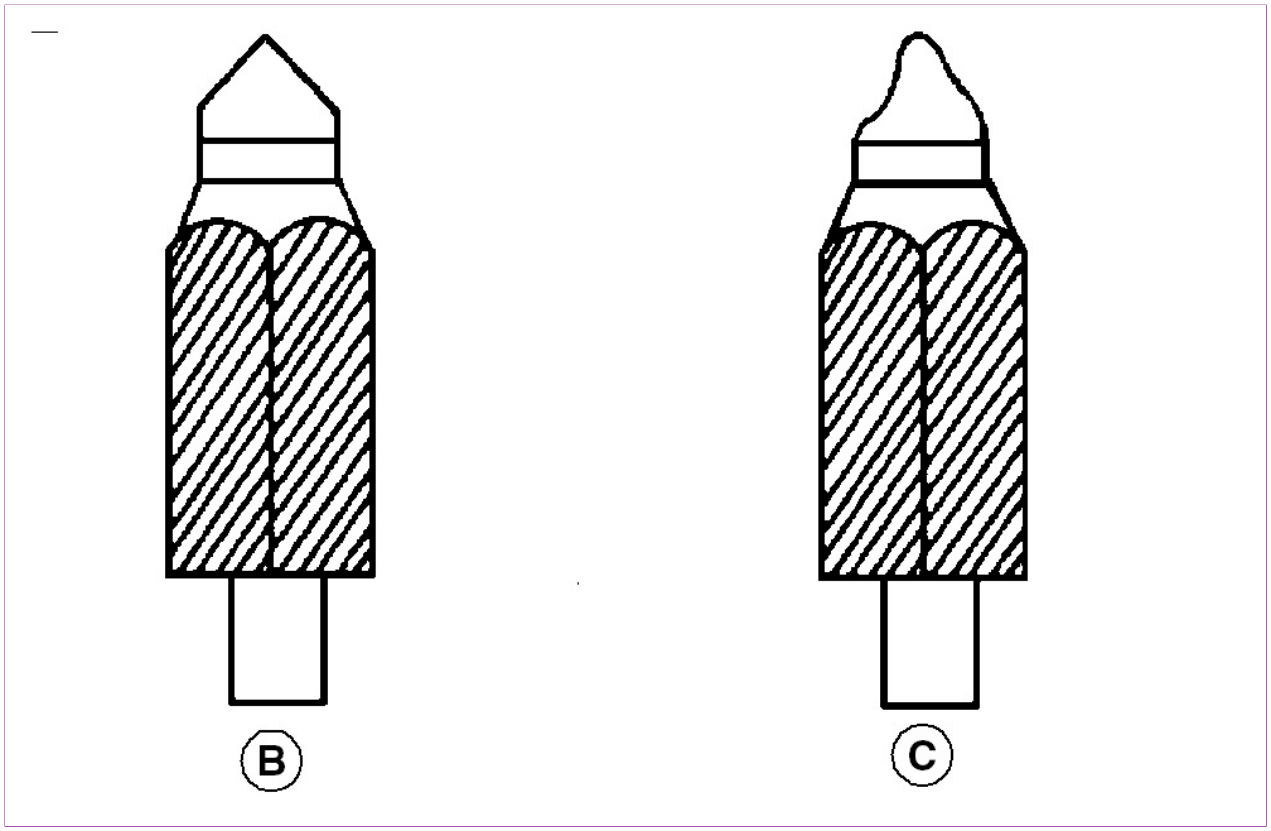
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Carburetor Disassembly

Carburetor Disassembly

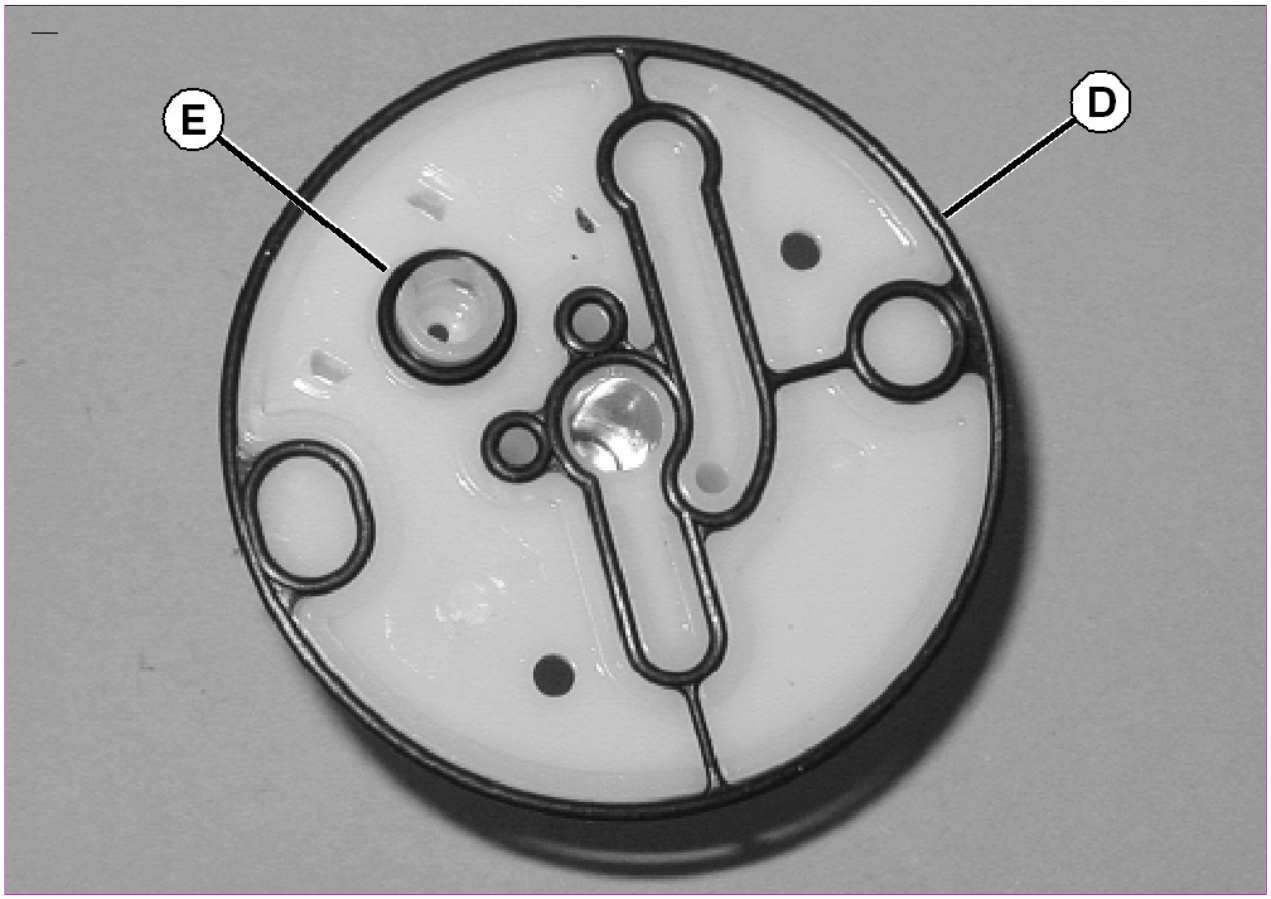
Procedure:

1. Remove fuel shutoff solenoid and fuel bowl washer.
2. Remove float bowl and float bowl gasket from carburetor.
3. 

With a small punch, drive the float hinge pin out of float hinge. Remove float and fuel inlet valve assembly (A).

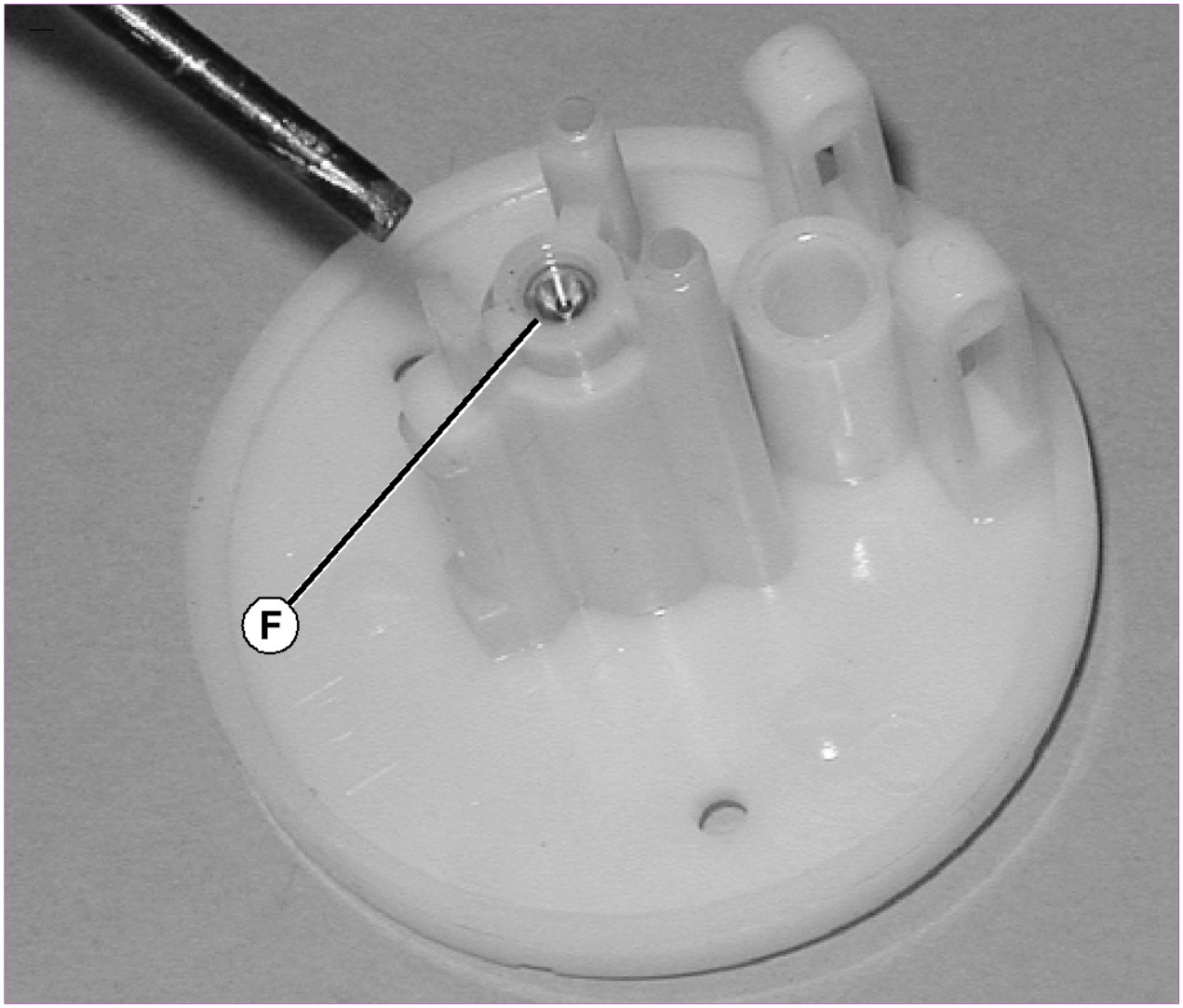


4. Inspect the float valve for excessive wear or damage.
   - The tip should be smooth, without any grooves, scratches, or tears (B). The rod at the opposite end of the needle should move smoothly when pushed in and released.
   - If either the valve or the valve seat is worn or damaged (C), replace the float assembly and carburetor as a set.

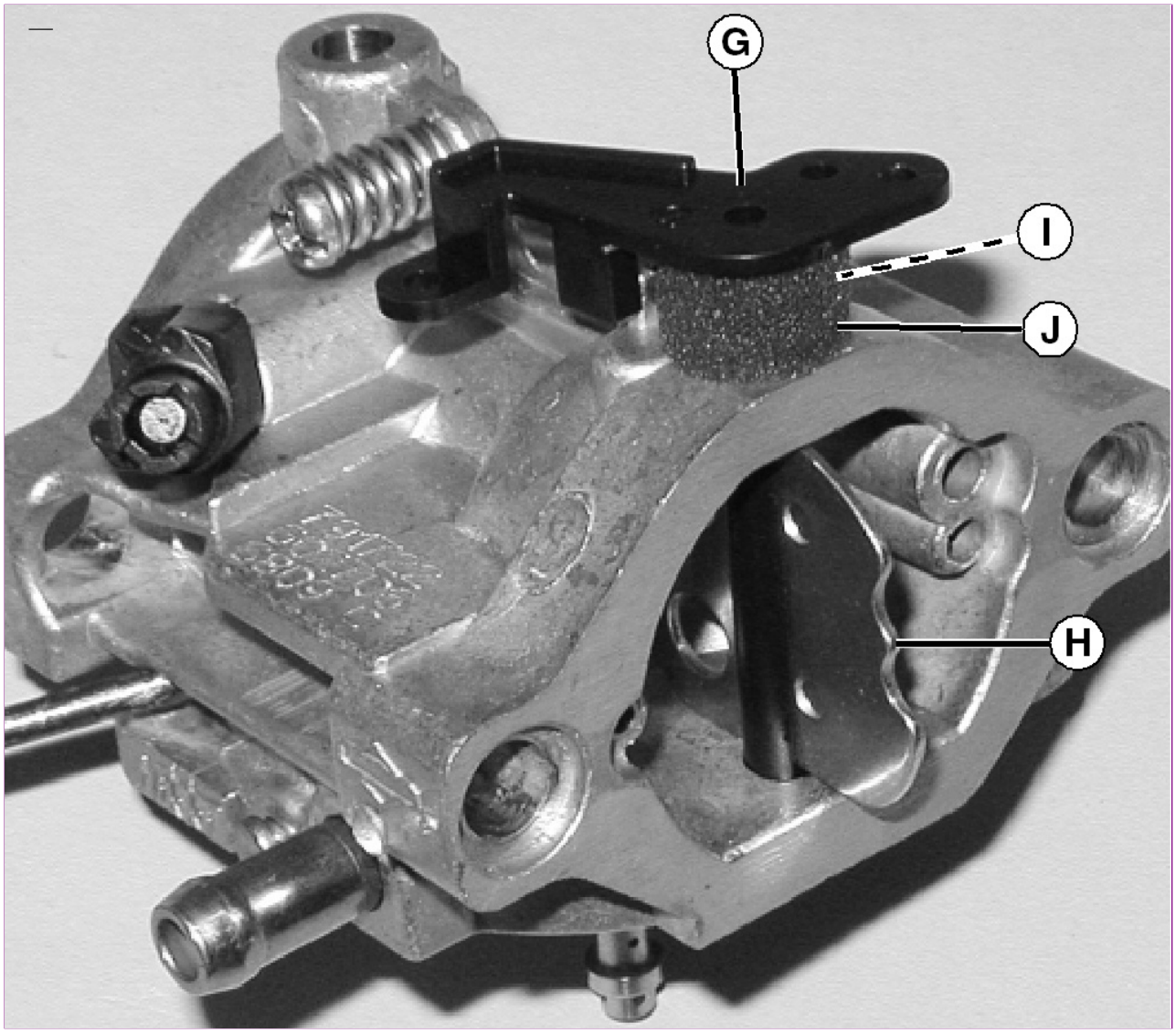


5. Lift the fuel transfer plate from the carburetor body.

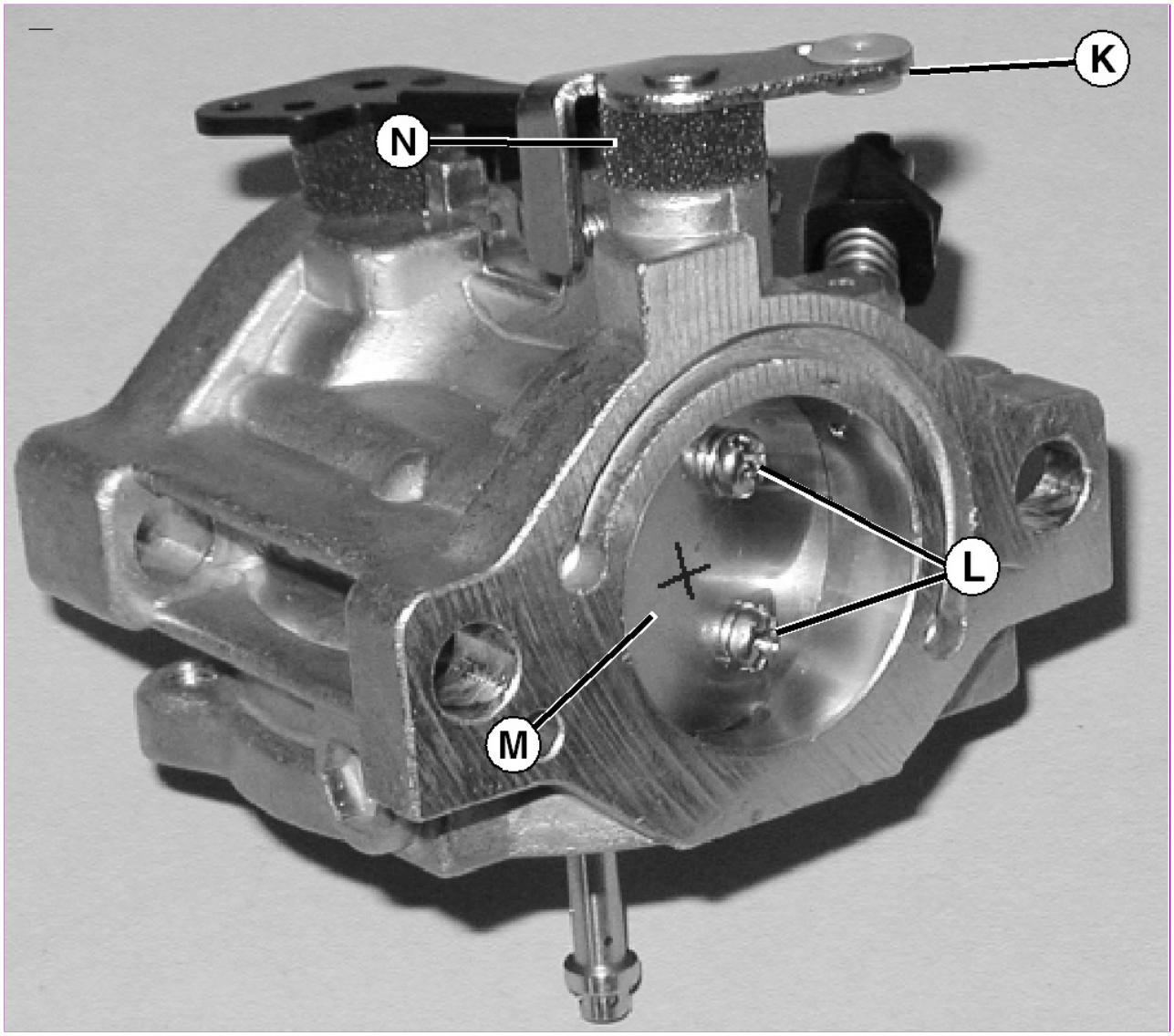
6. Remove the rubber gasket (D) and the o-ring (E).

7. 

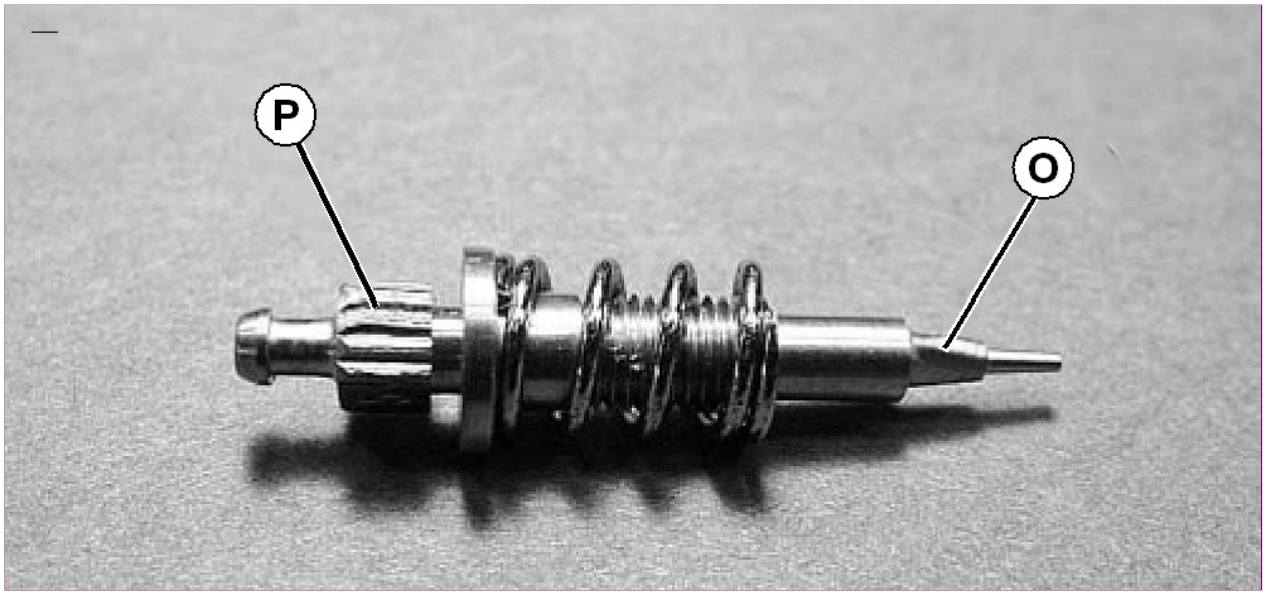
Using a punch of close diameter, press the jet (F) out of the pick-up tube.



8. Allow the spring to rotate choke shaft (G) to wide open position.
9. Pull choke valve (H) out of choke shaft and lever.
10. Remove choke shaft and lever, return spring (I), and foam washer (J).



11. Rotate throttle shaft and lever (K) closed. Mark throttle valve with a marker for installation. Remove two throttle valve screws (L).
12. Remove throttle valve (M), throttle shaft with lever, and foam seal (N).
13. Remove and replace the pilot screw in accordance with the following procedure, if necessary:
    - Carefully mark the position of the pilot screw limiter on the carburetor body so that it can be installed and set to its original position later.
    - Remove the limiter, being careful not to turn the pilot screw at this time.
    - Turn the pilot screw clockwise and count the number of turns until screw is gently seated in the pilot passage. Record the number of turns needed to close the screw.
    - Turn out the pilot screw to replace it with a new one.

14. 

Inspect the tapered portion (O) of the pilot screw (P) for wear or damage.
    - If the pilot screw is worn or damaged on the taper portion of it, replace it.
    - Check the spring for a weakened condition; replace it, if necessary.
15. Install the new pilot screw until the screw is gently seated. Then open the screw the same number of turns as recorded prior to removal.
    - Align the limiter with the mark on the carburetor body to install, taking care not to turn the pilot screw.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Carburetor Inspection

Carburetor Inspection

IMPORTANT:

A clean fuel system is necessary in order to maintain proper operation of the engine. Gummy or dirty fuel tanks and carburetors should be cleaned in carburetor cleaner. Do not soak rubber, neoprene or plastic parts in cleaner.

Procedure:

1. Clean the carburetor body and metal carburetor parts in carburetor cleaner to remove any gummy material or dirt. DO NOT soak rubber, neoprene or plastic parts in cleaner.
2. Check moving parts for wear, nicks and burrs. Replace if worn or damaged.
3. Check float for leaks or damage. Replace if damaged or leaking.
4. Carefully blow through all passages with dry, compressed air.
5. Inspect idle mixture needle for bent or grooved point. Replace if grooved or bent.

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Carburetor Assembly

Carburetor Assembly

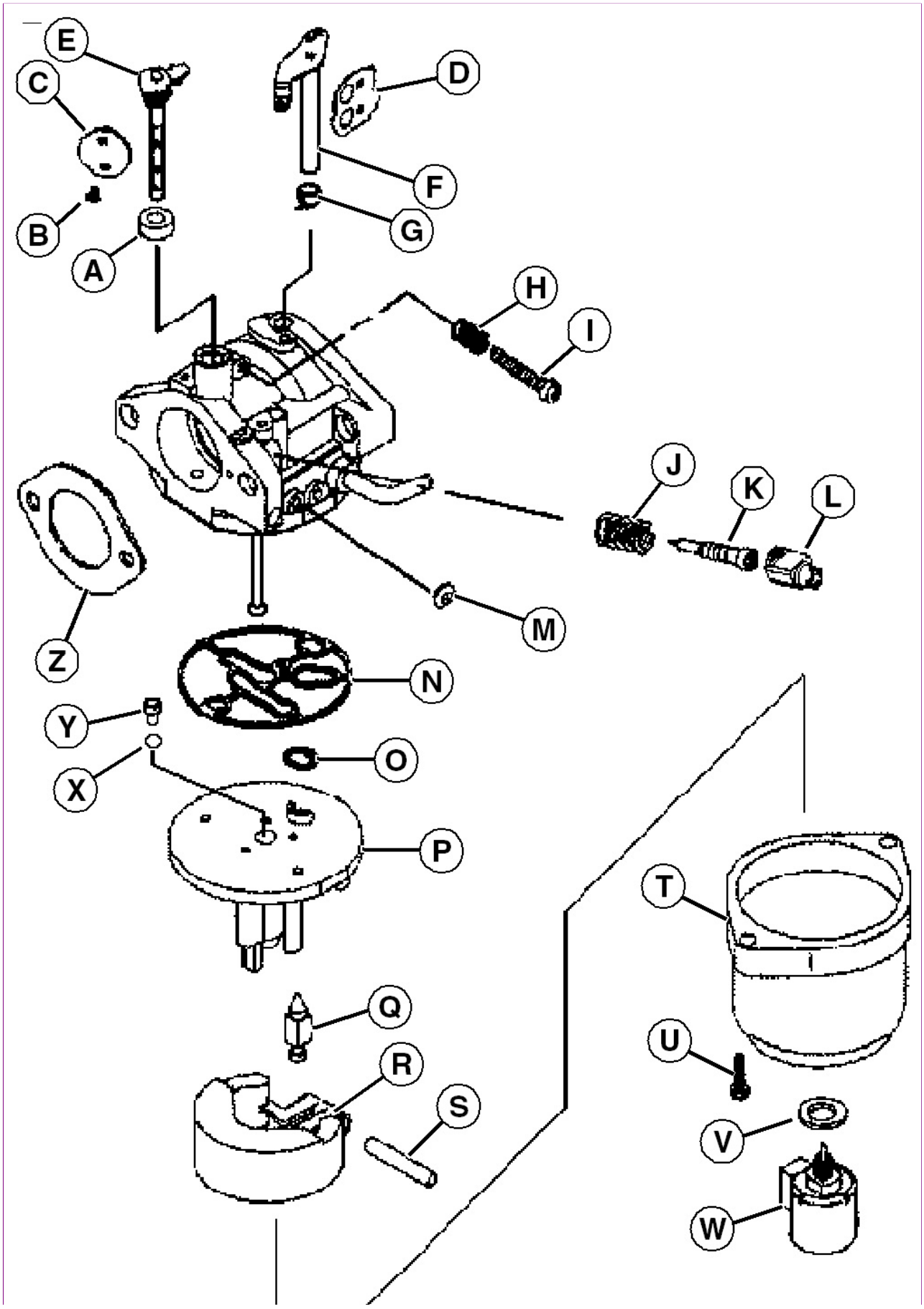
IMPORTANT:

When assembling the carburetor use new seals and gaskets.

NOTE:

A high altitude jet is available.

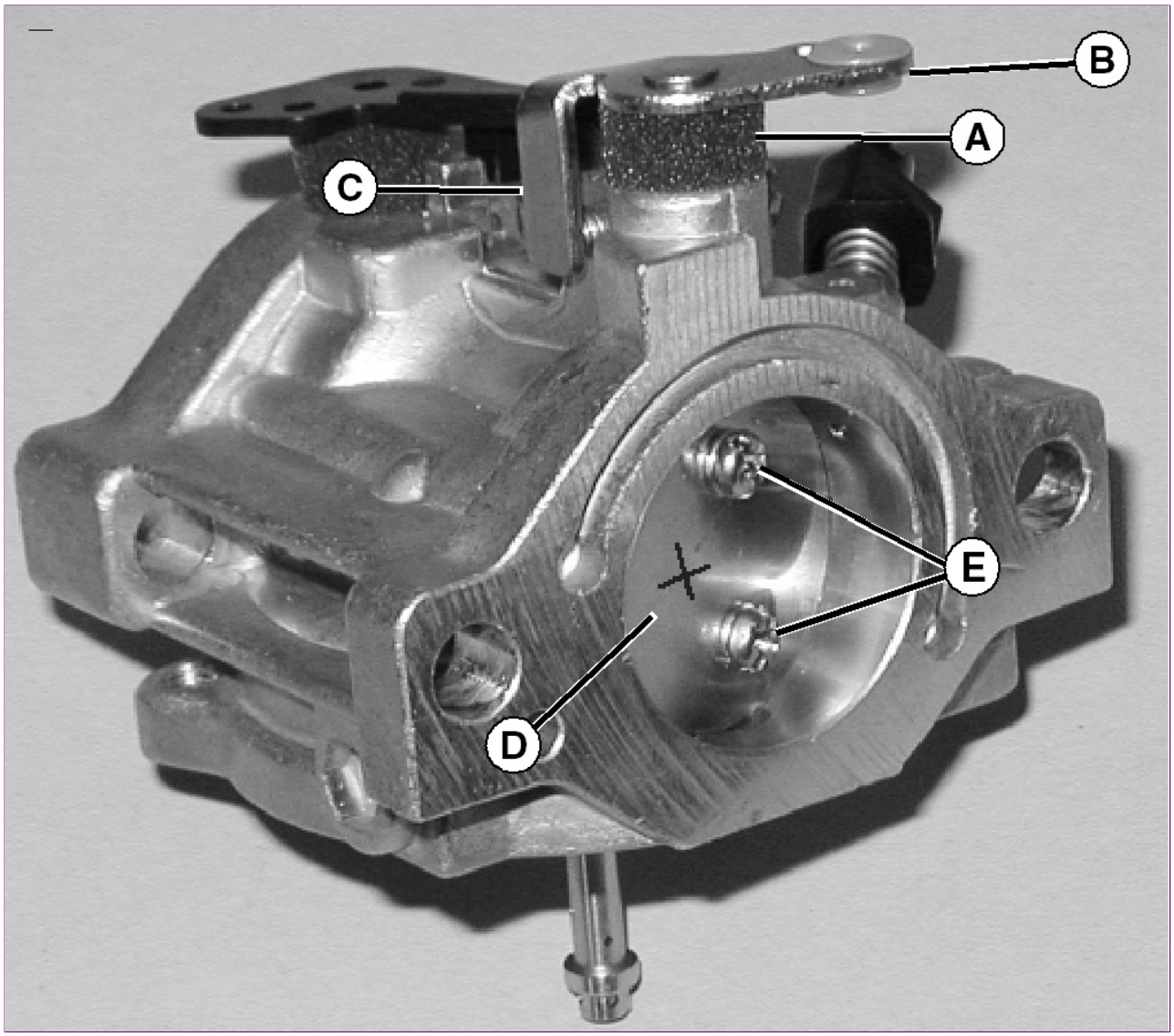
Procedure:


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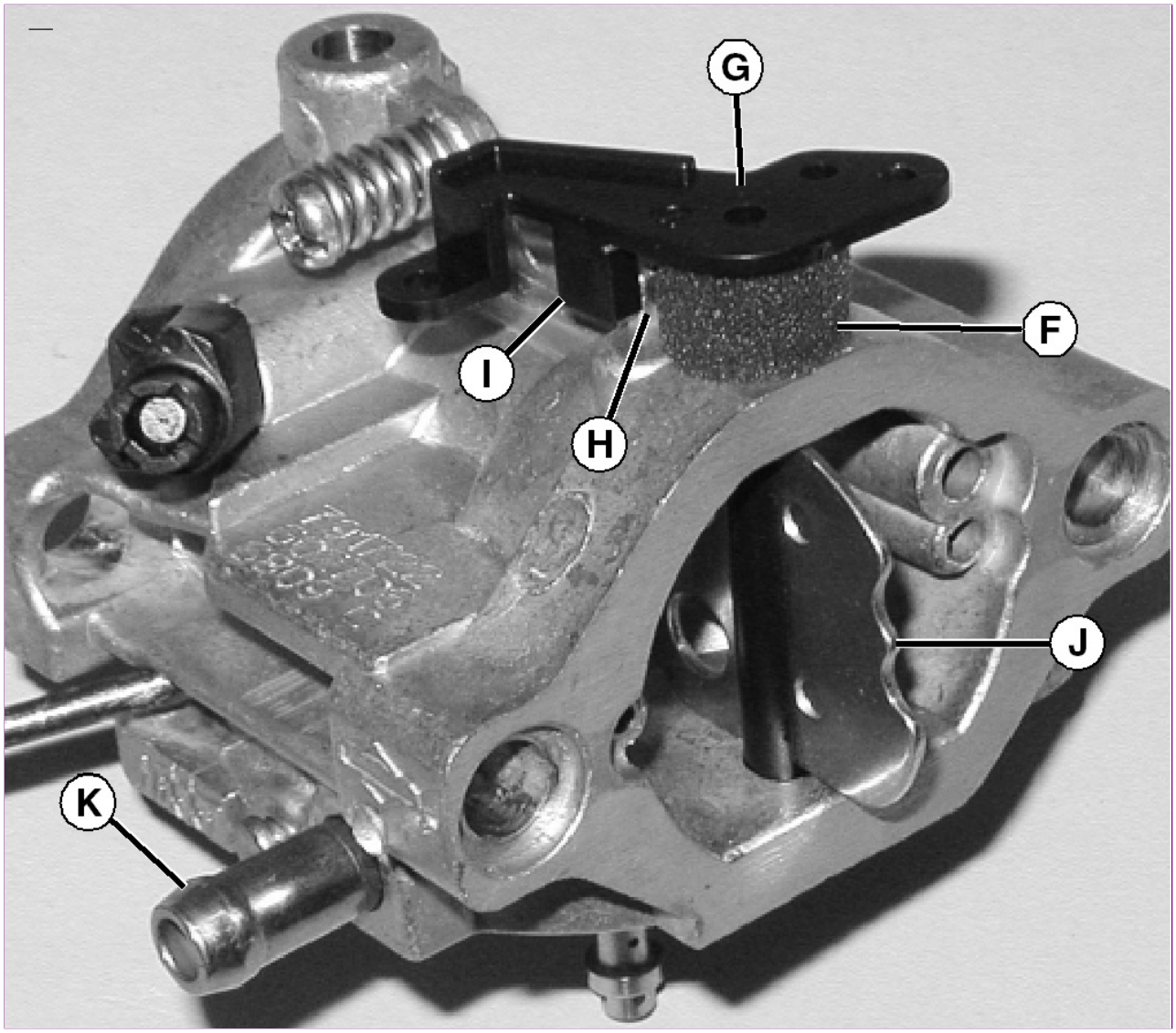
LEGEND:

A - Shaft Seal
B - Screw
C - Throttle Valve Plate
D - Throttle Shaft
E - Choke Valve Plate
F - Choke Shaft
G - Shaft Seal
H - Spring
I - Idle Speed Screw
J - Spring
K - Idle Needle Valve
L - Limiter Cap
M - Plug
N - Rubber Gasket
O - O-ring
P - Fuel Transfer Plate
Q - Fuel Inlet Valve
R - Float
S - Pin
T - Sediment Bowl
U - Screw
V - Seal Washer
W - Fuel Shutoff Solenoid
X - O-ring
Y - Jet
Z - Gasket - Intake

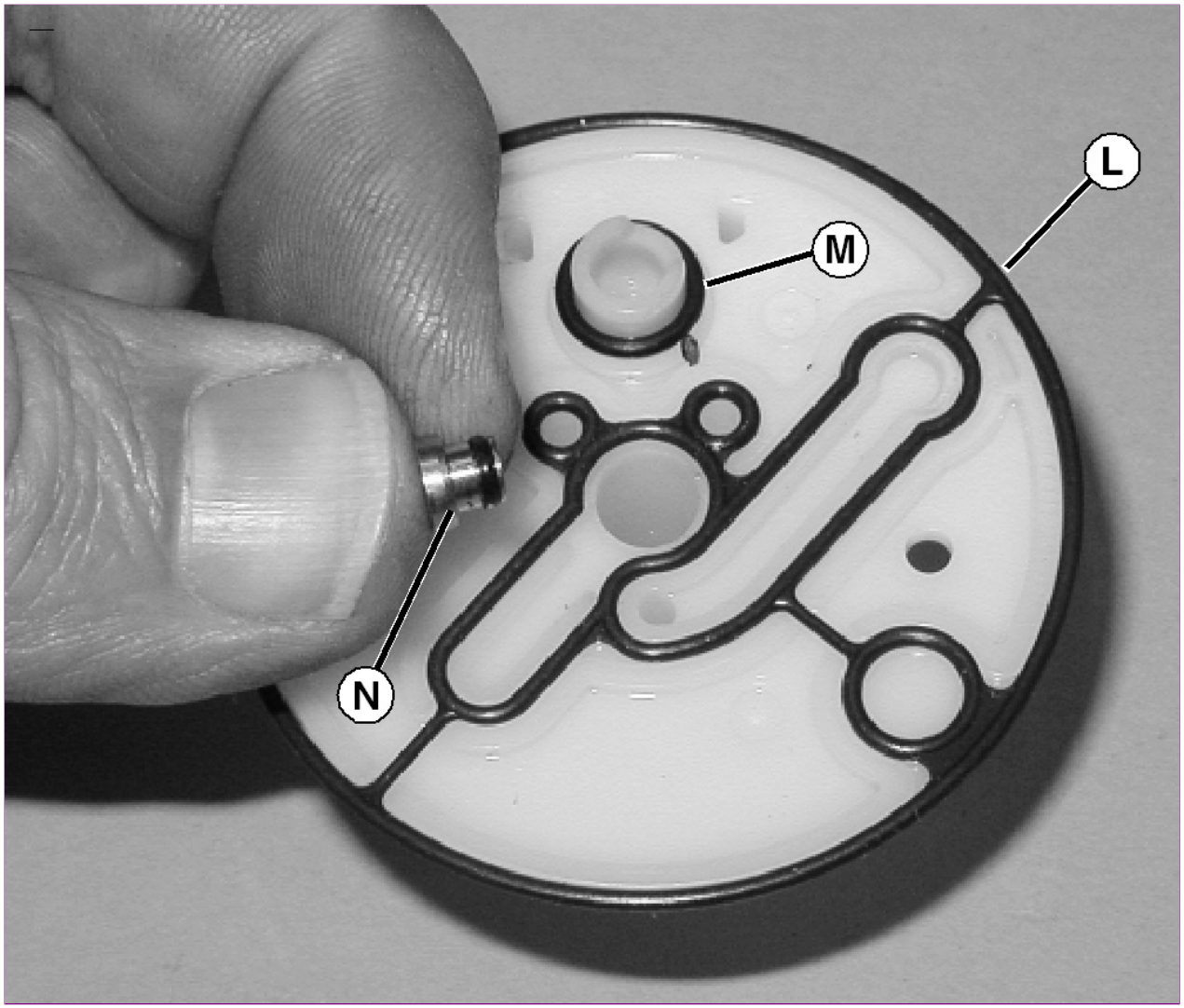
1. Install the new pilot screw until the screw is gently seated. Then open the screw the same number of turns as recorded prior to removal.
    - Align the limiter with the mark on the carburetor body to install, taking care not to turn the pilot screw.



2. Install the foam seal (A) onto the throttle shaft (B) and insert the shaft into the carburetor body so that the idle speed tab (C) contacts the idle speed screw and the flat portion of the shaft is facing outward.
3. Place the throttle valve (D) on the throttle shaft with mark from removal facing outward and secure with two throttle valve screws (E). Tighten to specification.



4. Insert spring inside foam seal (F). Slide seal and spring onto choke shaft (G) with straight end of spring up toward choke shaft lever.
5. Insert choke shaft into carburetor body until hook of spring hooks on spring anchor (H).
6. Lift choke shaft up slightly. Turn counterclockwise until stop (I) on lever clears spring anchor. Push shaft down.
7. Insert choke valve (J) into choke shaft with dimples away from fuel inlet (K) side of carburetor. Dimples help to hold and align choke valve on shaft.



8. Install the rubber gasket (L) and the o-ring (M).
9. Using a punch of close diameter, press the jet (N) into the pick-up tube with the o-ring end.
10. Place the fuel transfer plate onto the carburetor body.
11. Insert inlet needle valve in slot on float.
12. Place float and needle in carburetor and install float hinge pin, centering hinge pin.
13. Place bowl gasket on carburetor body.
14. Place bowl on carburetor and install float bowl washer and fuel shutoff solenoid and tighten to specification.

Item	Measurement	Specification
Specifications:		
Fuel Shutoff Solenoid torque		5 N•m 44 lb-in.)
Throttle valve		4.5 N•m 40 lb-in.)

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Breather Valve Service

Breather Valve Service

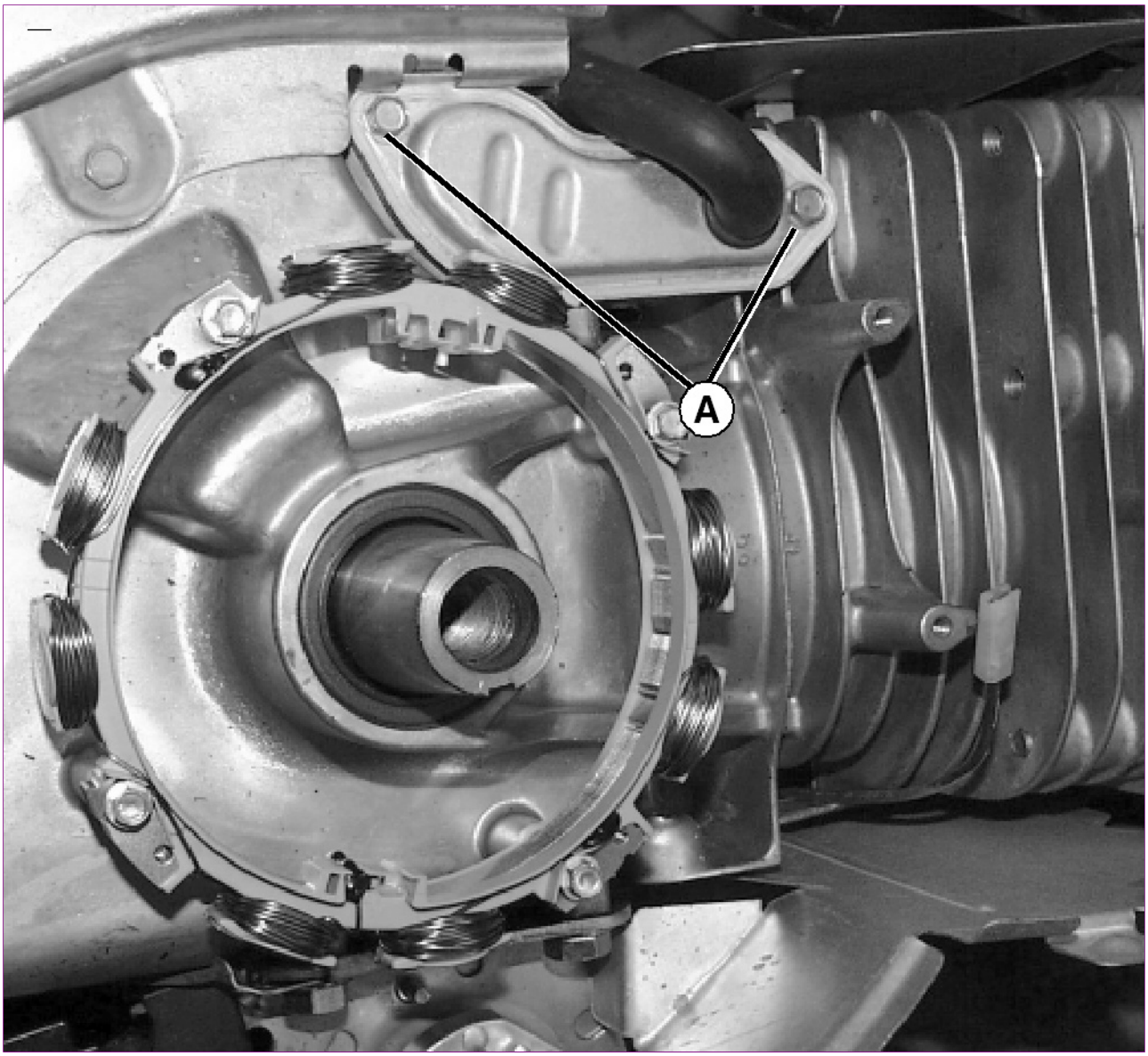
IMPORTANT:

A leak at the seal between the dipstick tube and crankcase cover, or at the seal at the upper end of the dipstick, can result in a loss of crankcase vacuum and a discharge of oil or smoke through the muffler.

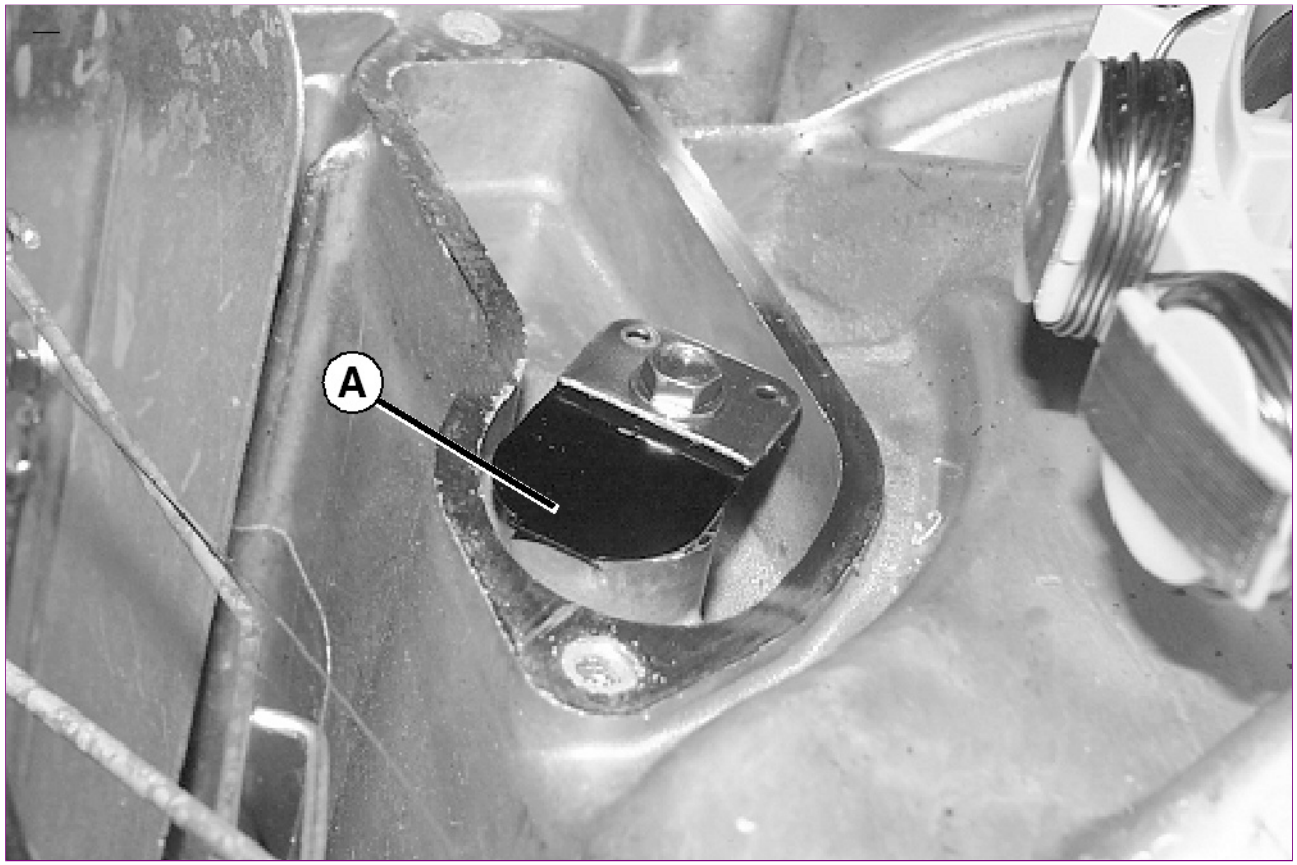
Procedure:

NOTE:

The engine utilizes a breather valve to maintain and control a vacuum in the crankcase. The breather valve closes on the up stroke of the piston and opens on the down stroke of the piston. This vacuum prevents oil leakage past piston rings, valve guides, oil seals, governor shaft and gaskets.

1. Remove flywheel. See Flywheel Removal and Installation .
2. Remove breather tube from breather.
3. 

Remove two screws (A) from breather cover. Remove cover and gasket. Discard old gasket.



4. Check the breather reed (A). Replace the reed if worn or bent.
5. *NOTE:*

   When installing breather cover, make sure gasket is located properly.

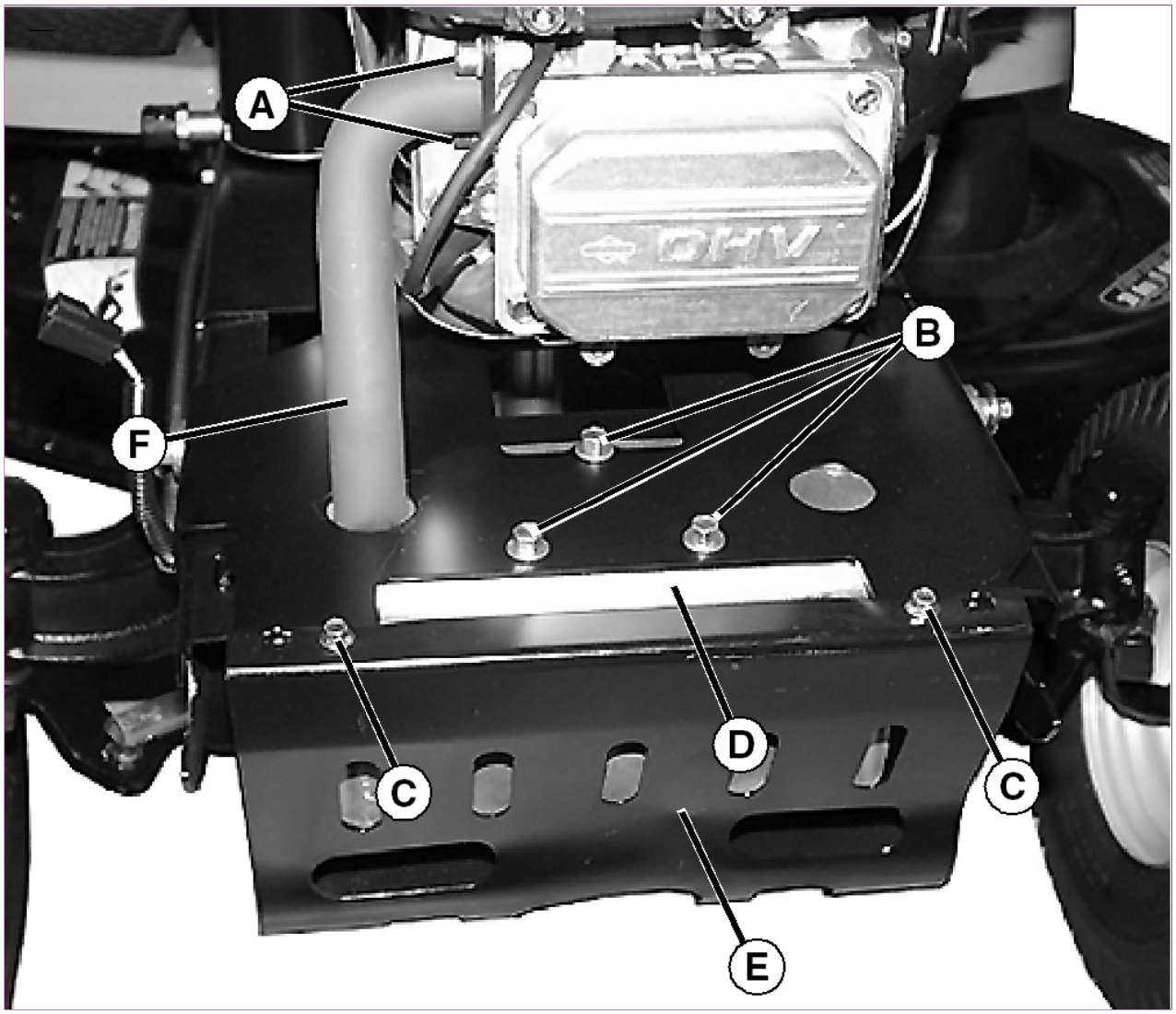
   Install breather using a new gasket. Tighten the screws to specification.
6. Install breather tube in breather.
7. Install flywheel.

Item	Measurement	Specification
Specification:		
Breather Cover Mounting Screws		3 N•m 25 lb-in.)

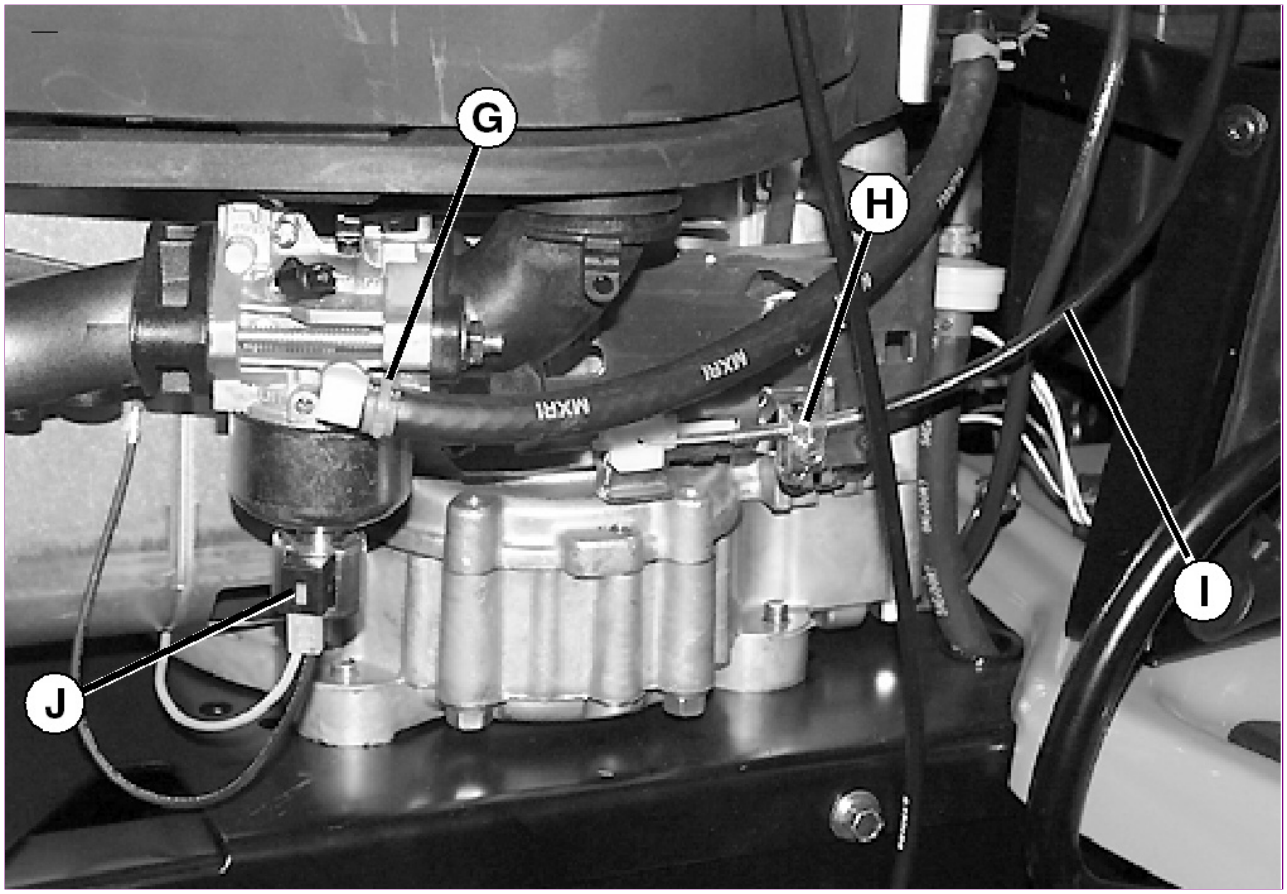
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Engine Removal

Engine Removal

Procedure:

1. Turn all switches OFF. Disconnect battery negative (-) cable.
2. Lock park brake to relieve tension on traction drive belt.
3. Remove mower deck.
4. Raise hood. Disconnect light harness on right side of hood. Lower hood to approximately 3/4 open. Slide the hood off the bracket.
5. 

Remove two cap screws (C). Lower heat shield (E) from machine frame.
6. Remove three cap screws (B). Lower muffler (D) from exhaust manifold (F).
7. Remove two cap screws (A) securing exhaust manifold (F) to engine. Remove exhaust manifold (F).

8. 

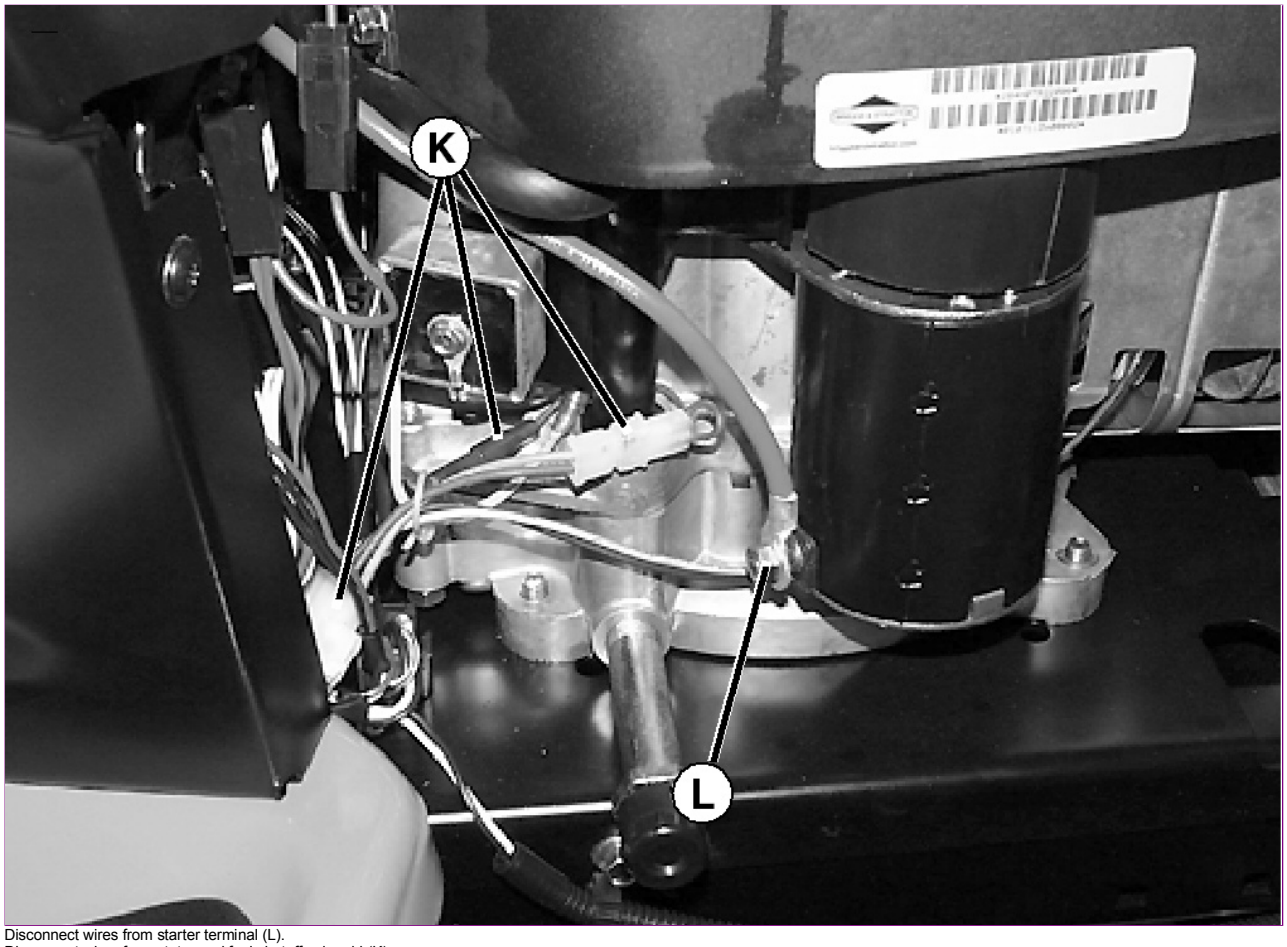
Loosen clamp (H) to disconnect throttle cable (I).

9. ***CAUTION:***

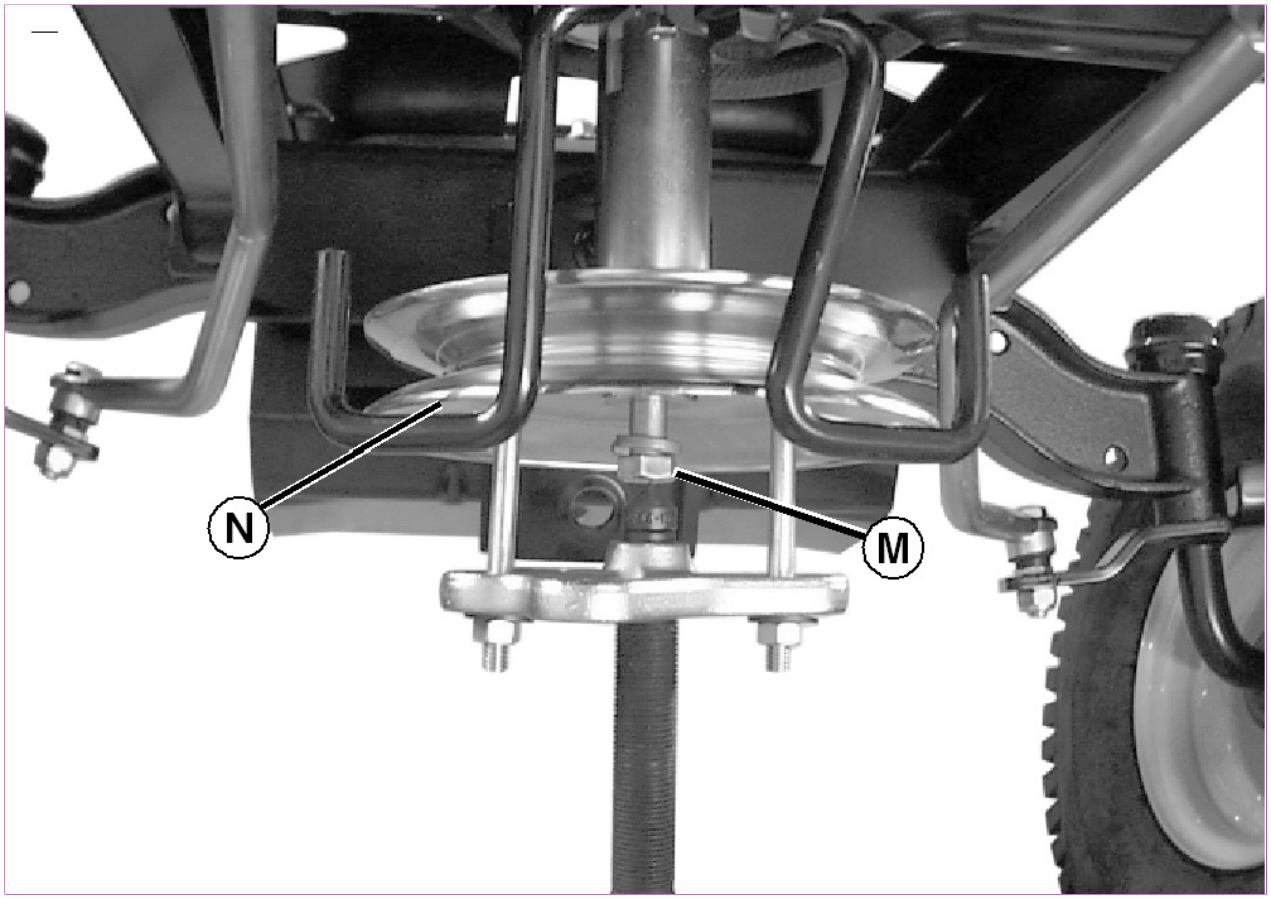
Fuel vapors are explosive and flammable:

- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Shut off engine before servicing.***
- ***Cool engine before servicing.***
- ***Work in a well-ventilated area.***
- ***Clean up spilled fuel immediately.***

Disconnect fuel solenoid wire (J), and hose clamp (G). Slide fuel line off hose barb on carburetor.



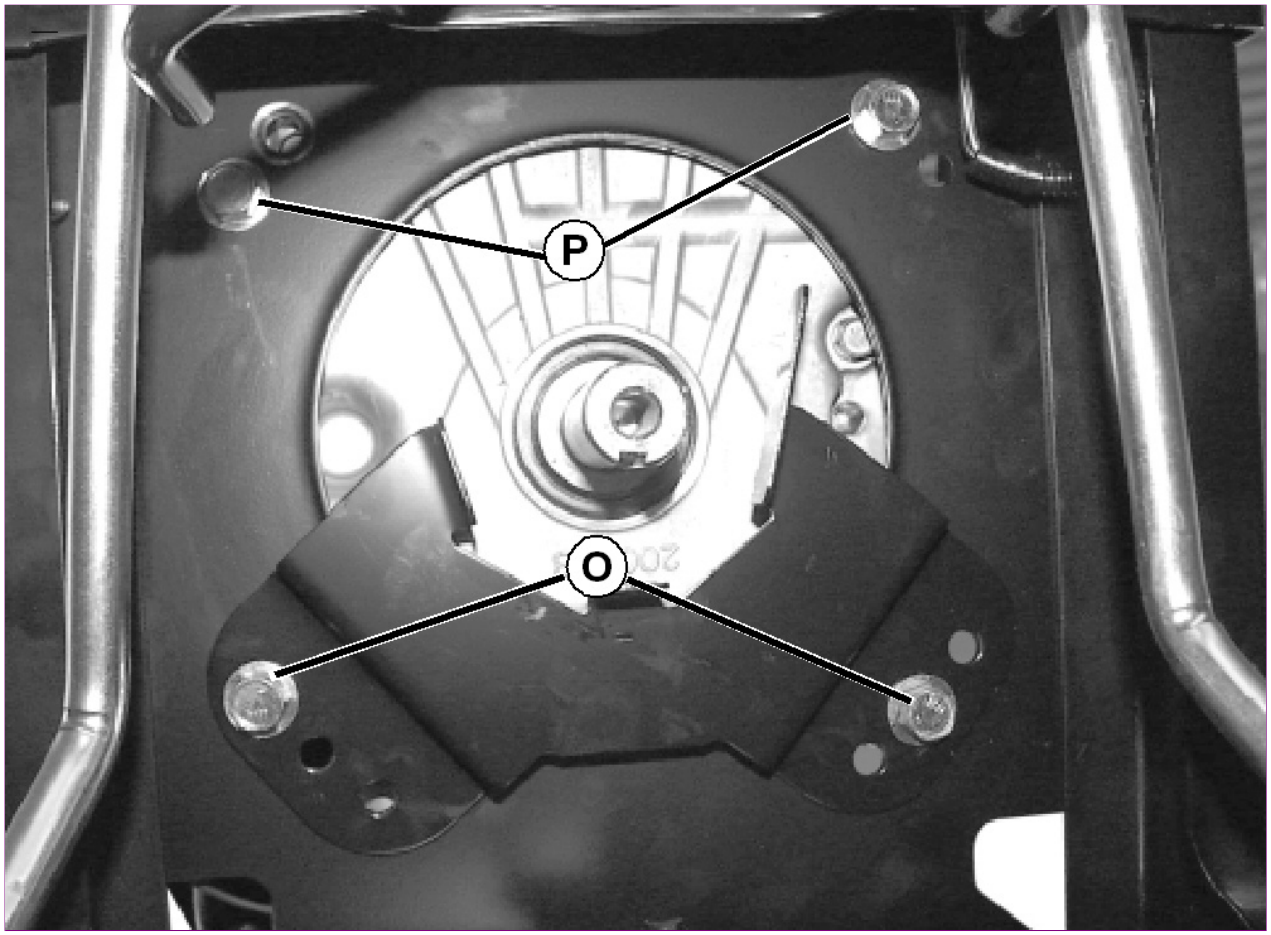
10. Disconnect wires from starter terminal (L).
11. Disconnect wires from stator and fuel shutoff solenoid (K).
12. Lock park brake to relieve tension on traction drive belt.



13. Loosen cap screw (M) and lock washer securing pulley assembly (N) to engine output shaft.
14. **IMPORTANT:**

    Do not pry pulley assembly or sheaves will bend and require replacement.

    Install puller on lower sheave. Remove pulley assembly.
15. Remove traction drive belt from around pulley.

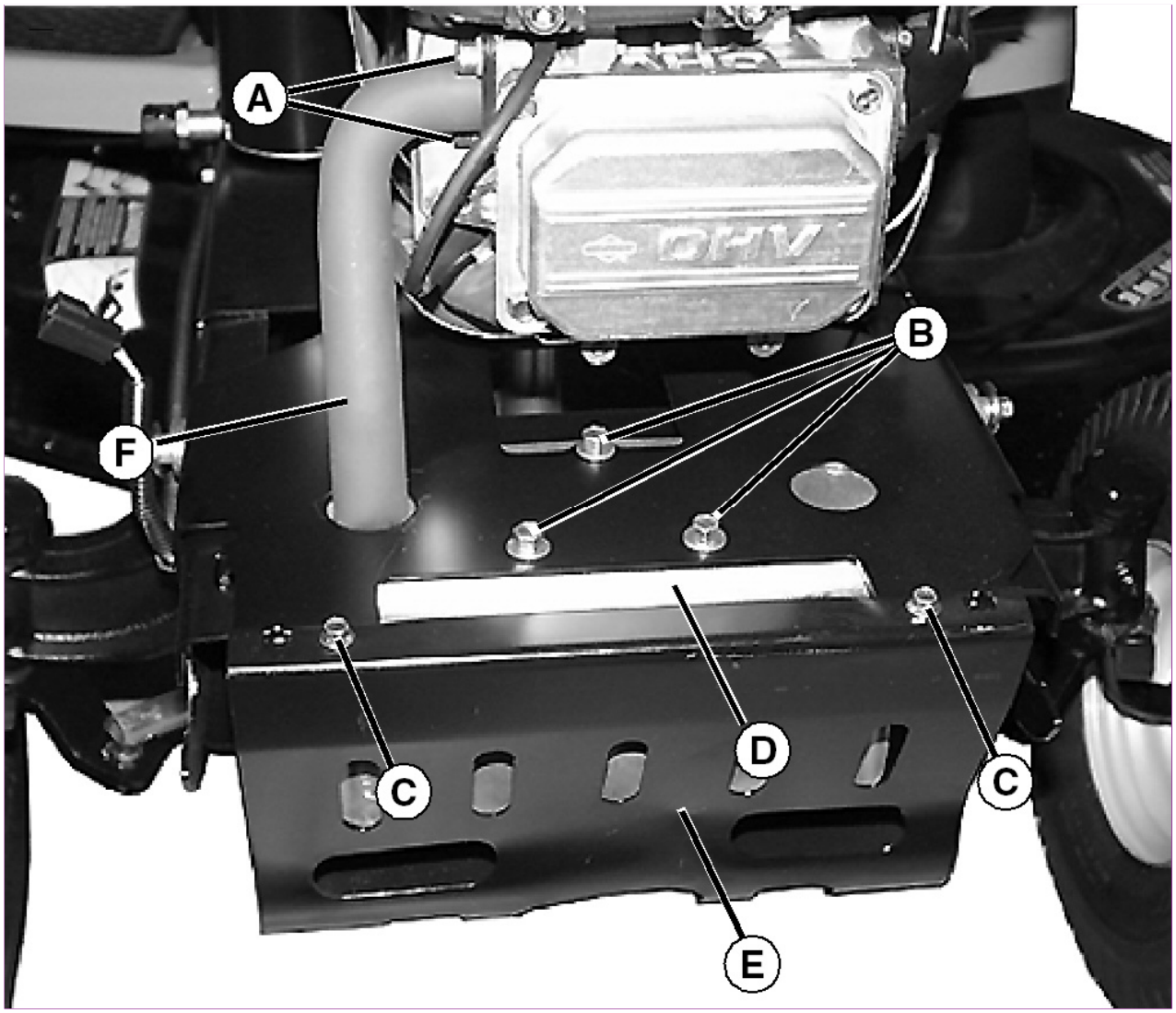


16. Remove two cap screws (O) securing belt guard and engine to frame. Remove belt guard.
17. Remove two remaining cap screws (P) and engine.

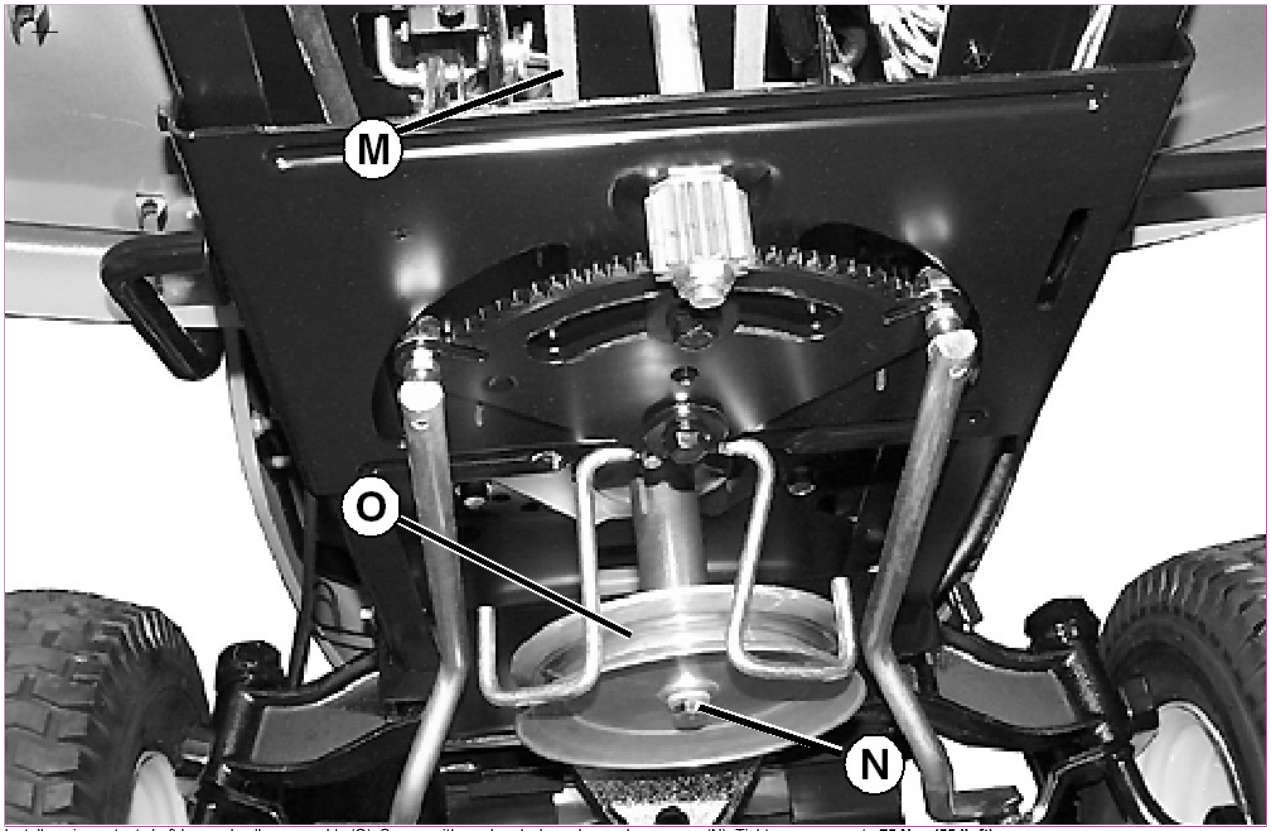
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Engine Installation

Engine Installation

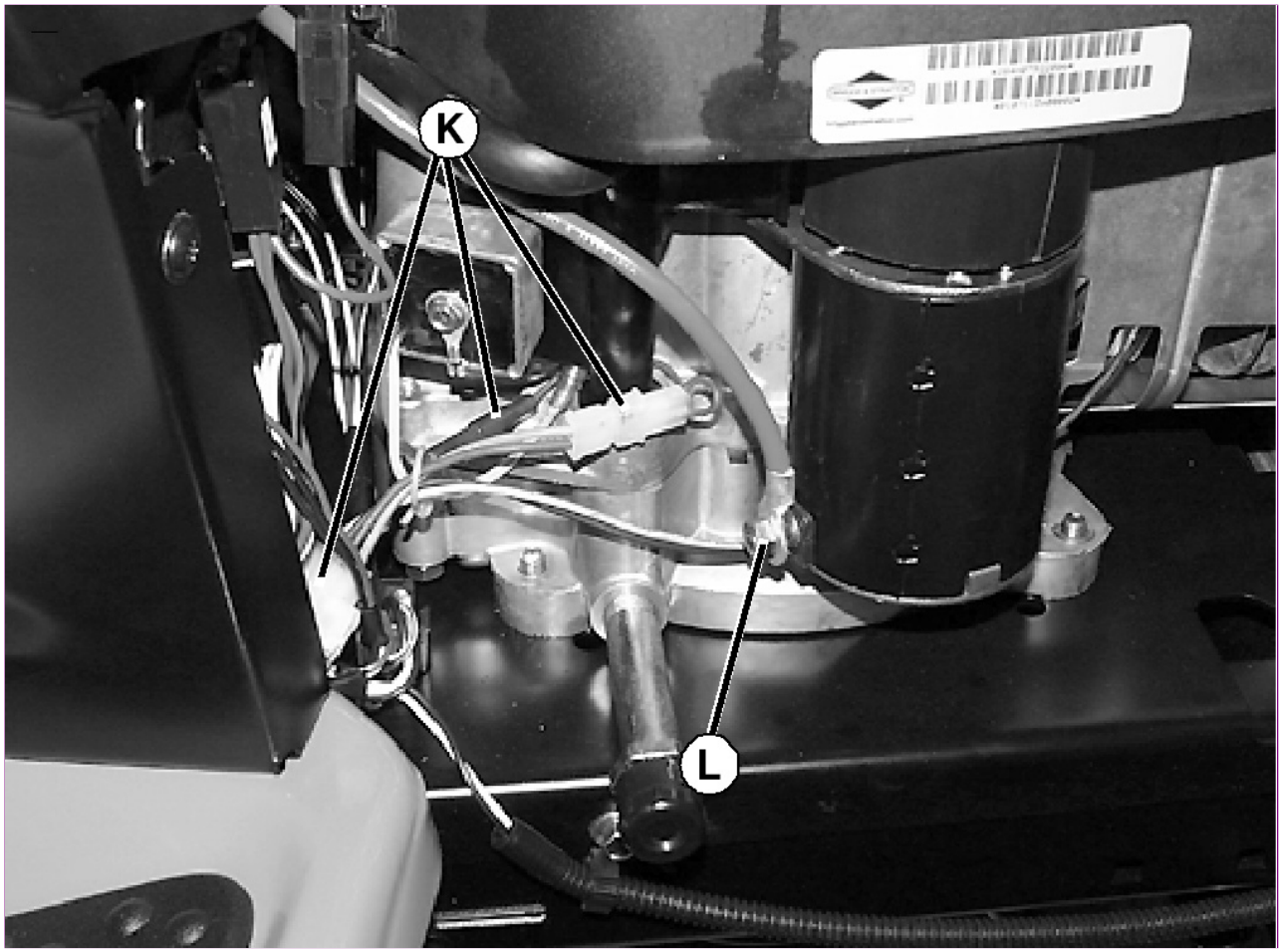
Procedure:

1. Install engine onto machine frame.
2. Install four cap screws, washers, and nuts securing engine and belt guard to frame. Tighten to **32 N•m (24 lb-ft)** .
3. 

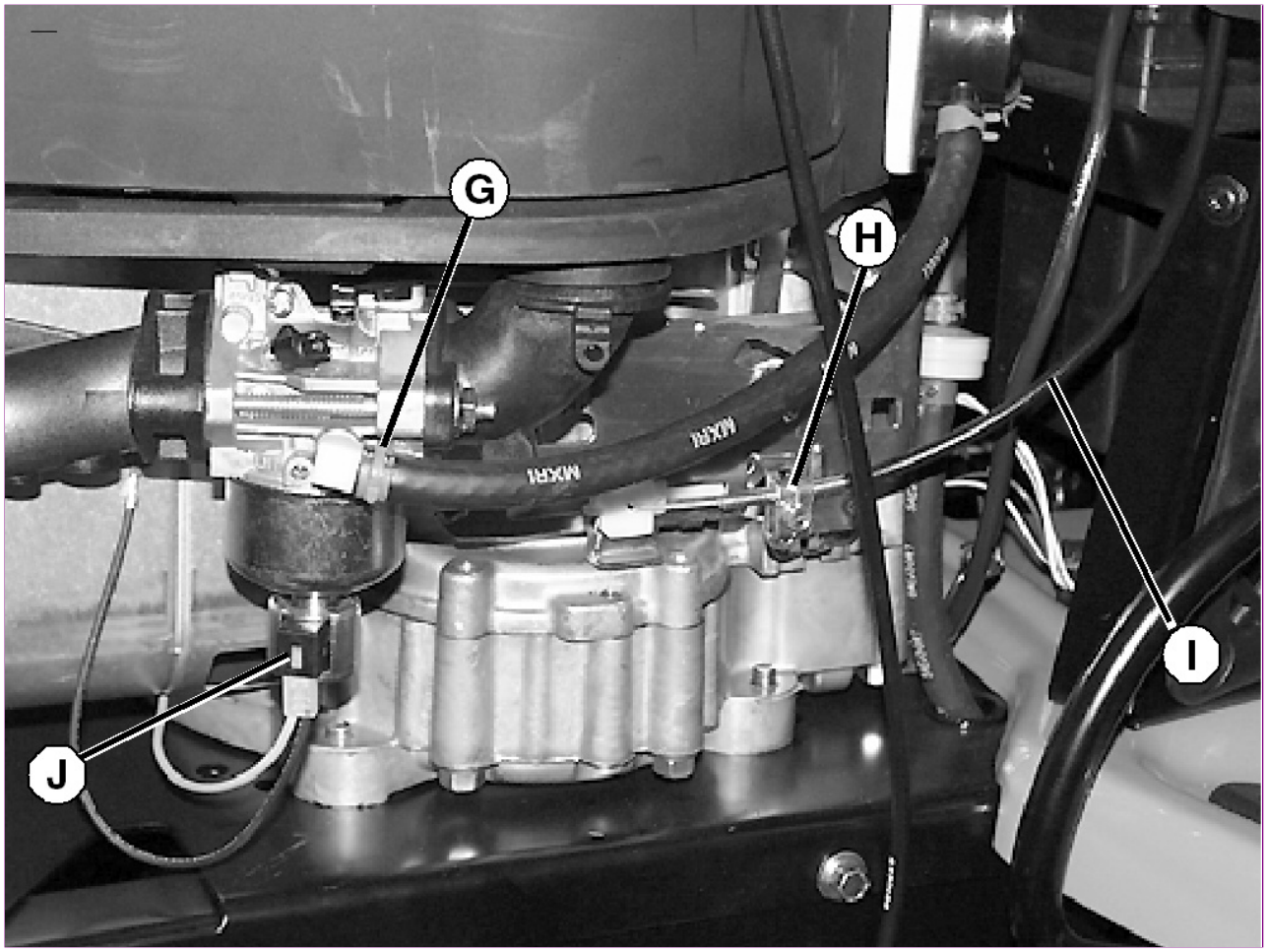
Install exhaust manifold (F), with new gasket, to engine. Secure with two cap screws (A). Tighten cap screws to **19 N•m (165 lb-in.)** .
4. Inspect muffler flange for flatness. Install muffler (D) onto frame and secure with three mounting bolts (B). Tighten mounting bolts (B) to **19 N•m (165 lb-in.)** .
5. Install heat shield (E). Secure with two cap screws (C) to front frame mounting brackets.



6. Install engine output shaft key and pulley assembly (O). Secure with washer, lock washer and cap screw (N). Tighten cap screw to **75 N•m (55 lb-ft)** .
7. Install traction drive belt (M) onto small end of pulley (O).

8. 

Connect wires to starter terminal (L).
9. Connect wire connectors to stator and fuel shutoff solenoid (J).



10. Connect and adjust throttle cable (I) with clamp (H). See Throttle Cable Adjustment .
11. Connect fuel solenoid wire (J). Connect fuel line and clamp (G).
12. Connect battery negative (-) cable.

Item	Measurement	Specification
Specifications:		
Engine Mounting Bolts		32 N•m 24 lb-ft)
Exhaust Manifold Bolts		19 N•m 165 lb-in.)
Output Pulley Assembly		75 N•m 55 lb-ft)
Heat Shield Screws		5 N•m 40 lb-in.)
Drive Belt Idler Pulley		10 N•m 85 lb-in.)

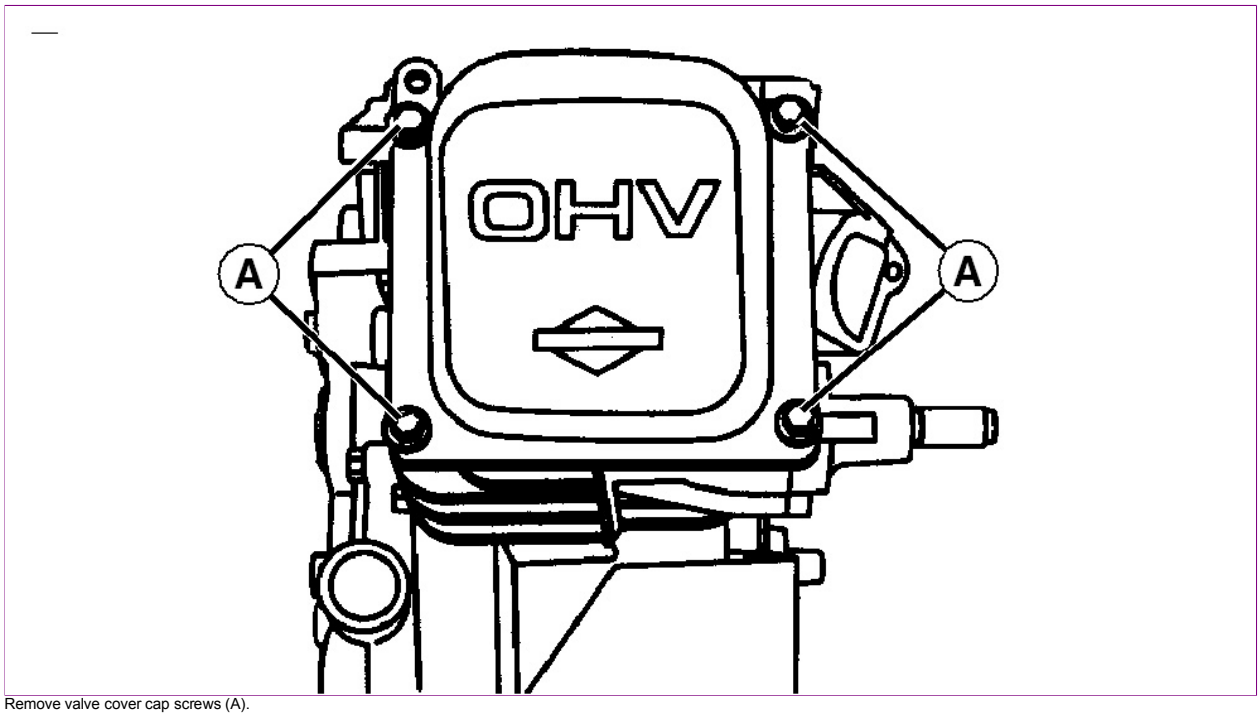
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Head Removal and Installation

Cylinder Head Removal and Installation

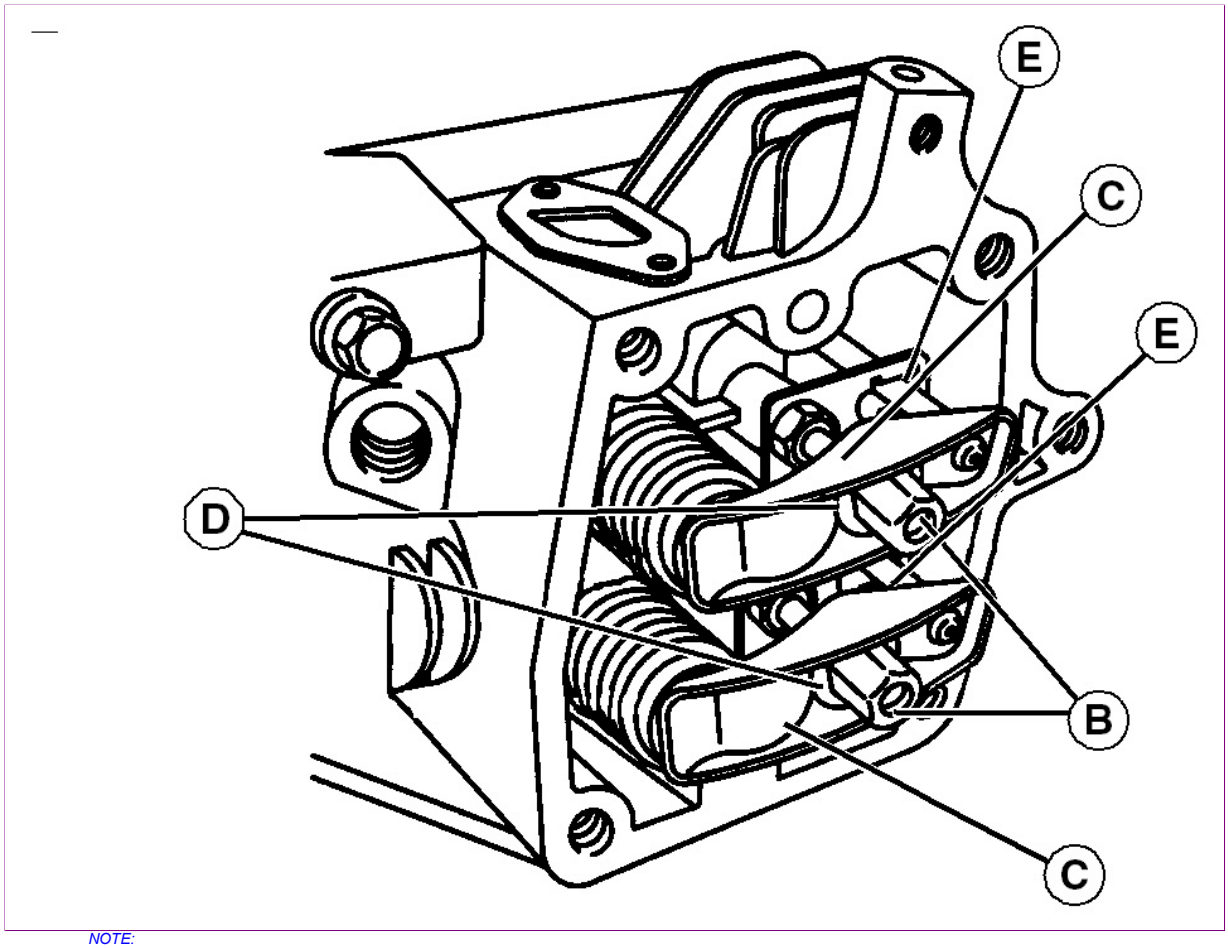
Removal: IMPORTANT:

Mark all parts when disassembling cylinder heads to prevent interchanging.

1. Disconnect spark plug lead and remove spark plug.
2. Remove air cleaner assembly, carburetor and blower housing.
3. Remove intake manifold and governor control bracket and linkage.



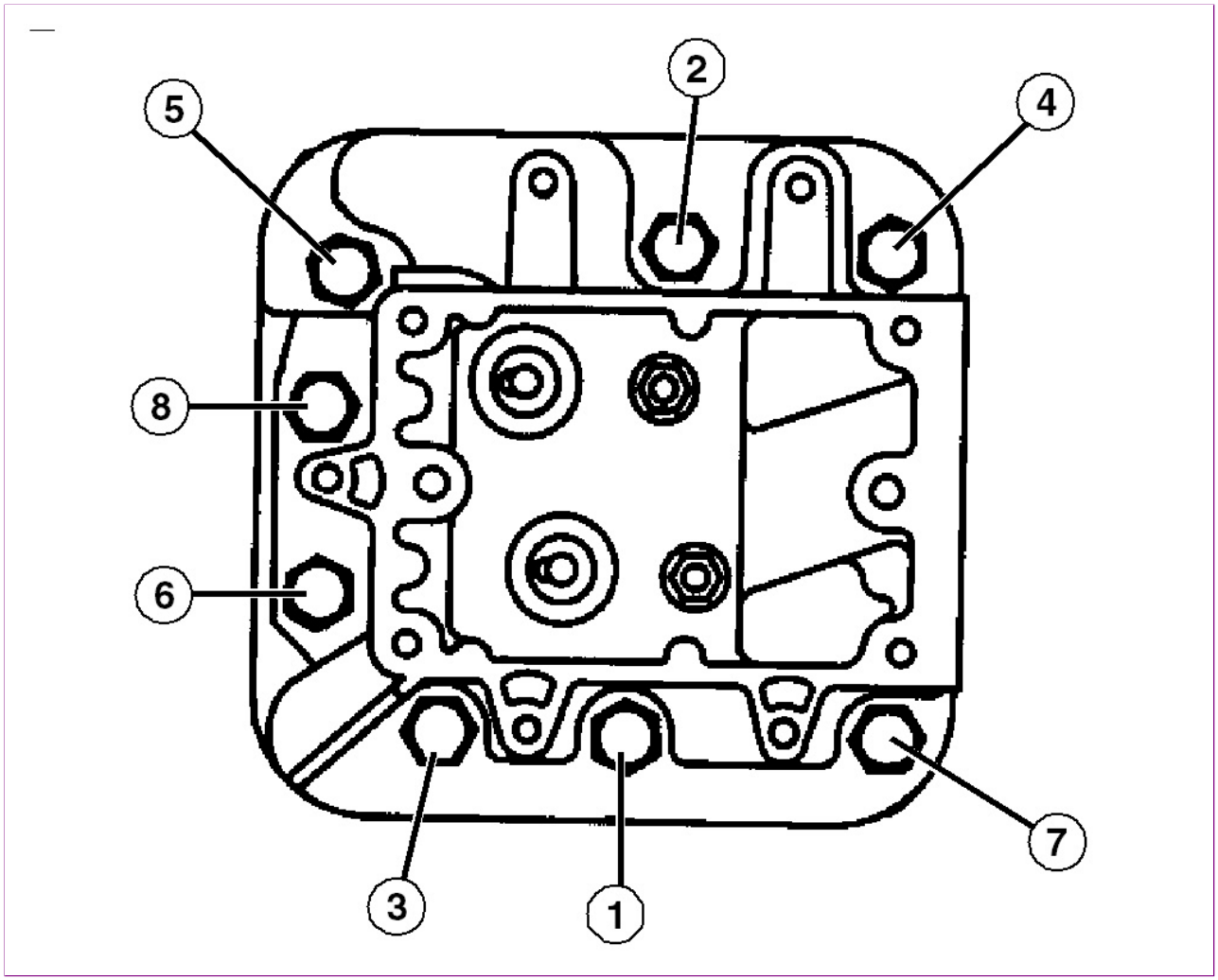
4. Remove valve cover cap screws (A).

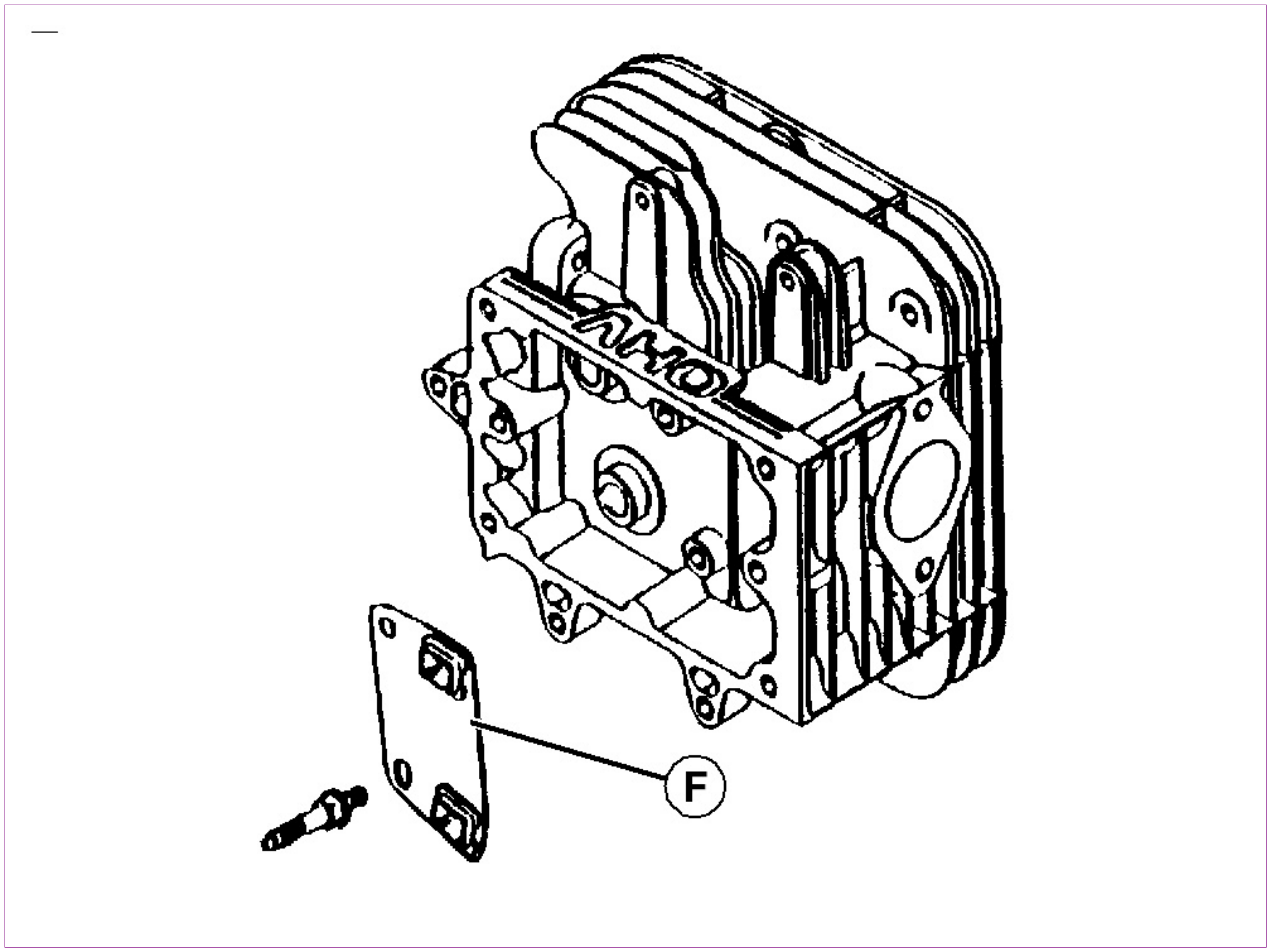


5. *NOTE:*

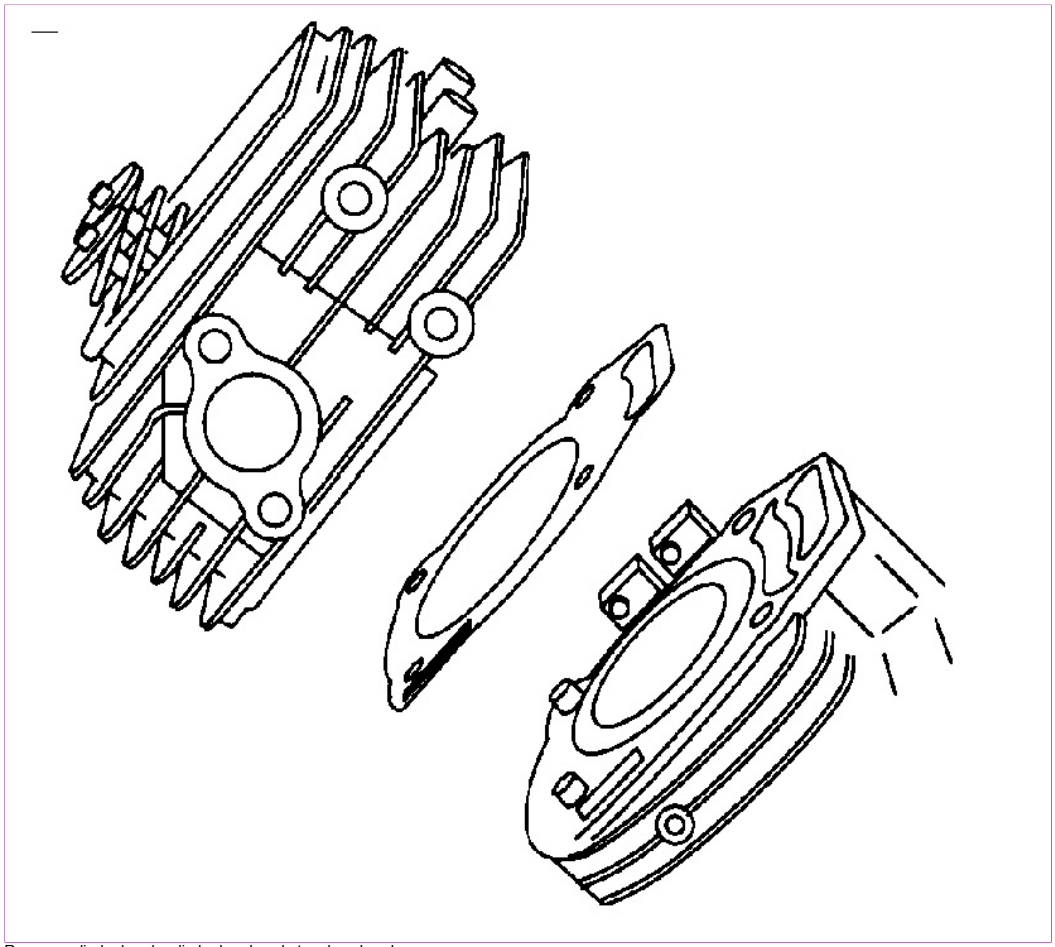
   Mark the push rods for reassembly in their original position. The exhaust valve push rod is steel and is marked with a red stripe. The intake valve push rod is aluminum.

   Remove rocker arm adjustment nuts (B), rocker arms (C), rocker arm pivots (D), and push rods (E).


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6. Remove push rod guide plate (F).
7. Remove eight cylinder head bolts in sequence shown.

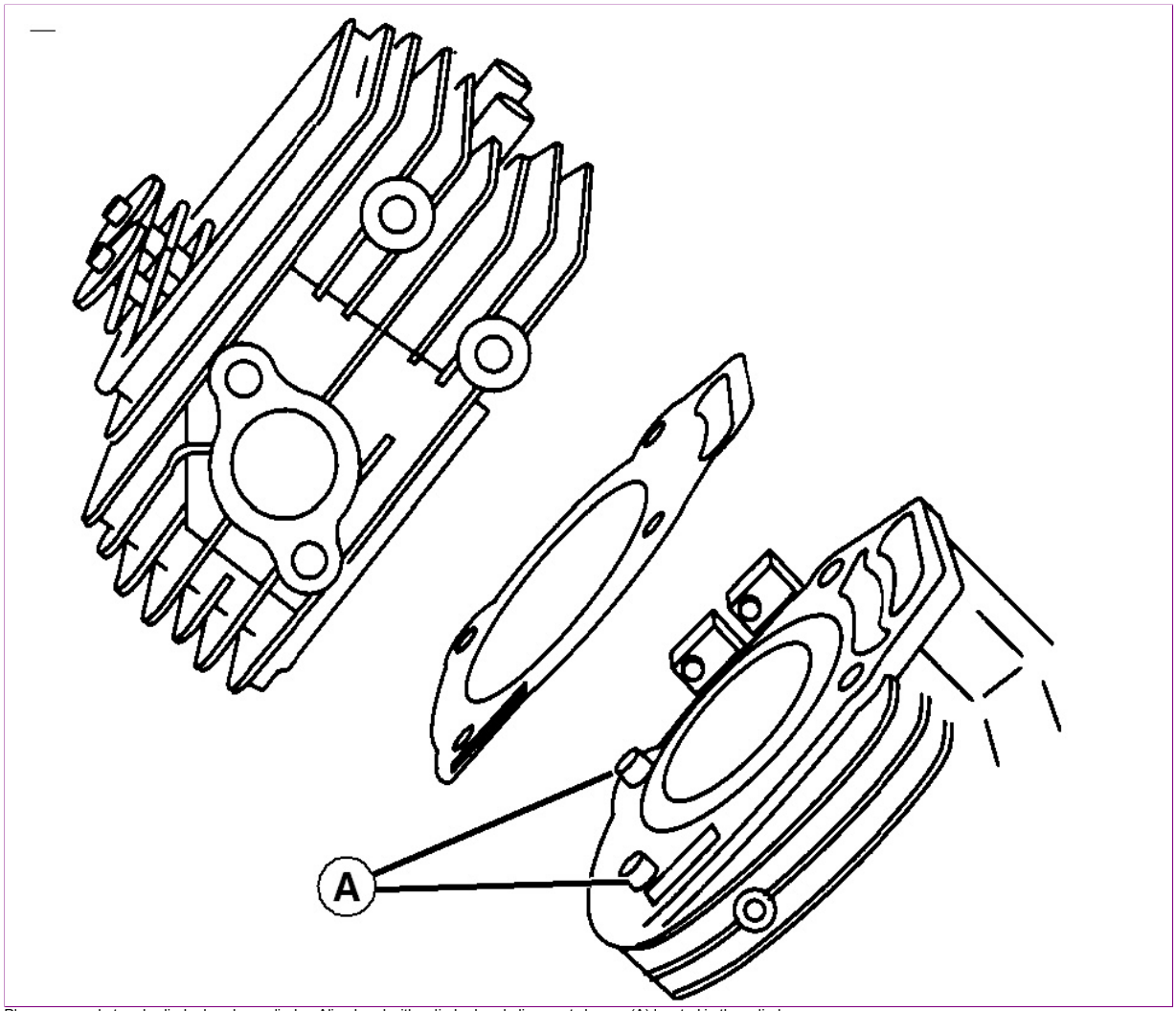


8. Remove cylinder head, cylinder head gasket and push rods.

Installation:

1. **IMPORTANT:**

   Do not use sealer of any kind on gaskets.

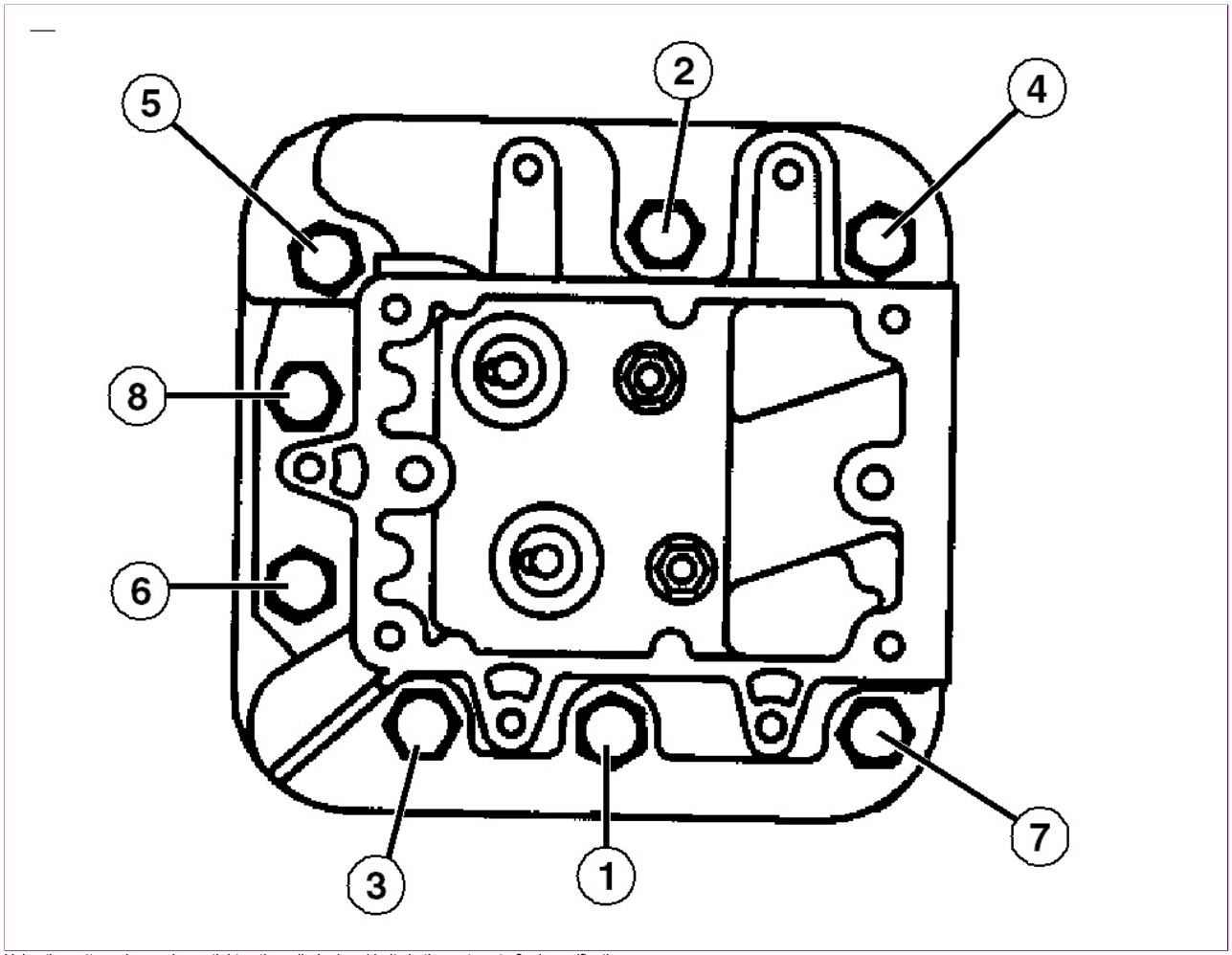


Place new gasket and cylinder head on cylinder. Align head with cylinder head alignment sleeves (A) located in the cylinder.

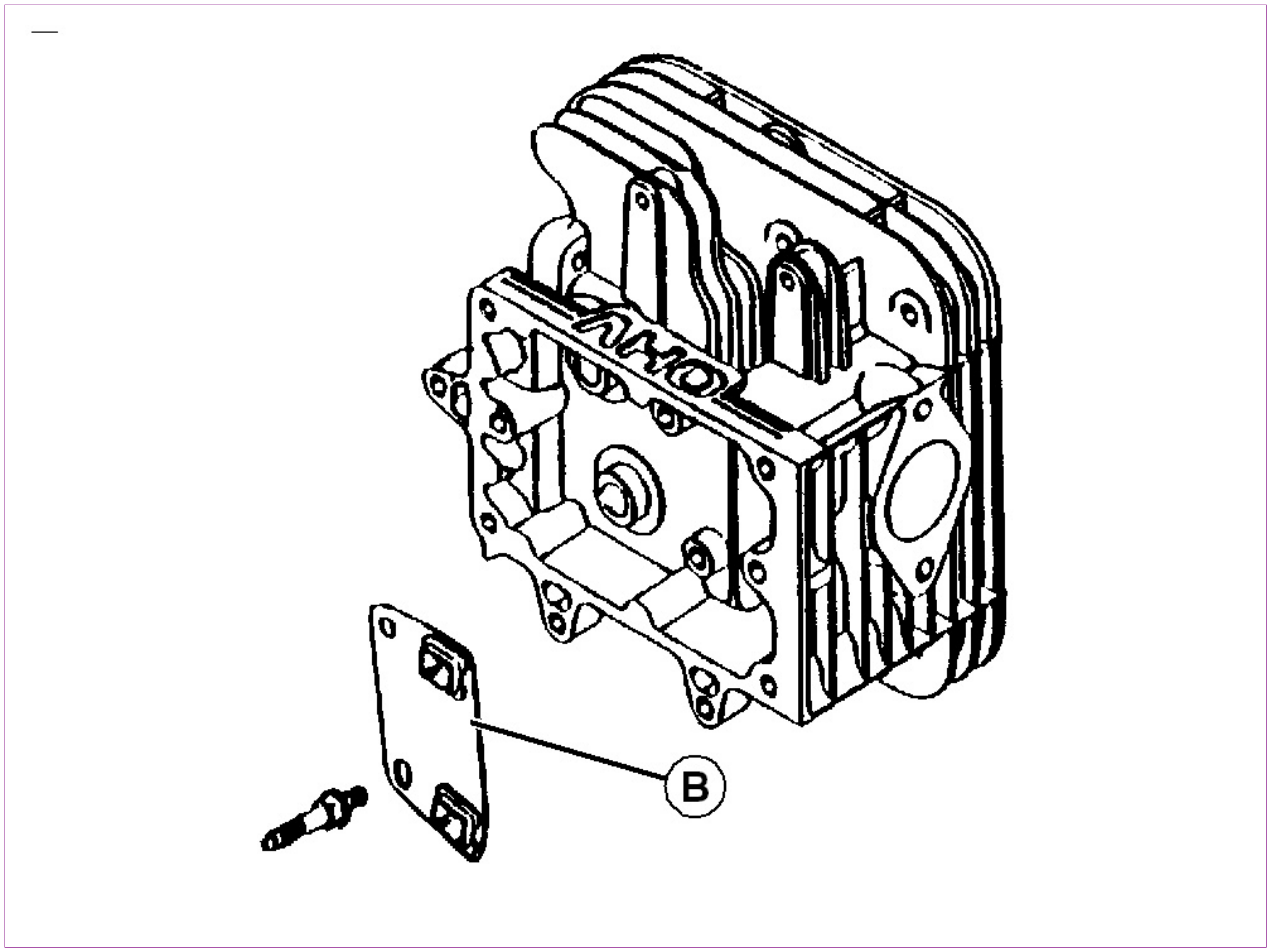
2. Apply a small amount of clean engine oil to bolt threads. Install eight cylinder heads bolts.
3. **IMPORTANT:**

   Do not tighten one bolt to final torque before all others are tightened to the second step. Incorrect tightening may cause a warped cylinder head.

   Tighten eight bolts down evenly by hand.

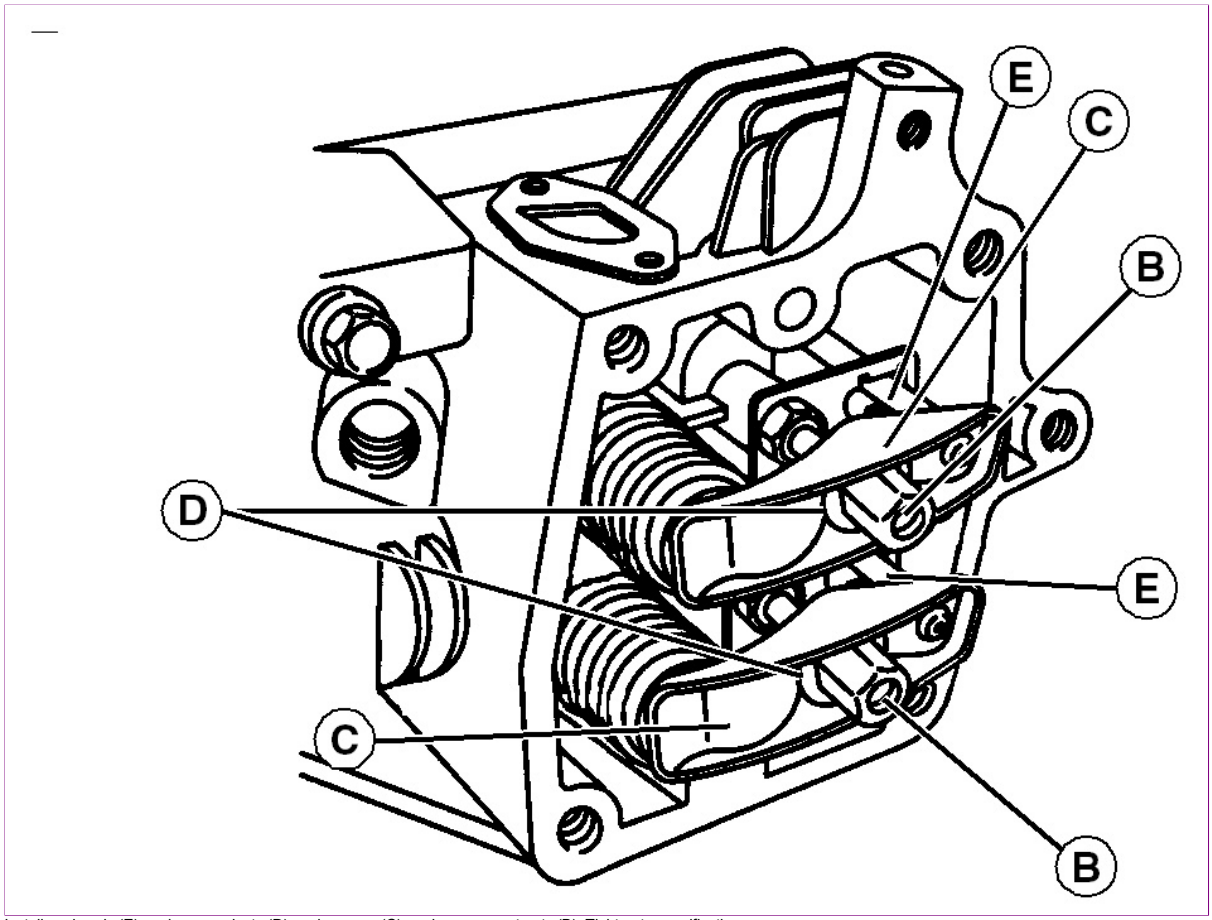


4. Using the pattern shown above, tighten the cylinder head bolts in three steps to final specification.
   - First step - **9 N•m (75 lb-in.)**
   - Second step - **17 N•m (150 lb-in.)**
   - Final step - **25 N•m (220 lb-in.)**



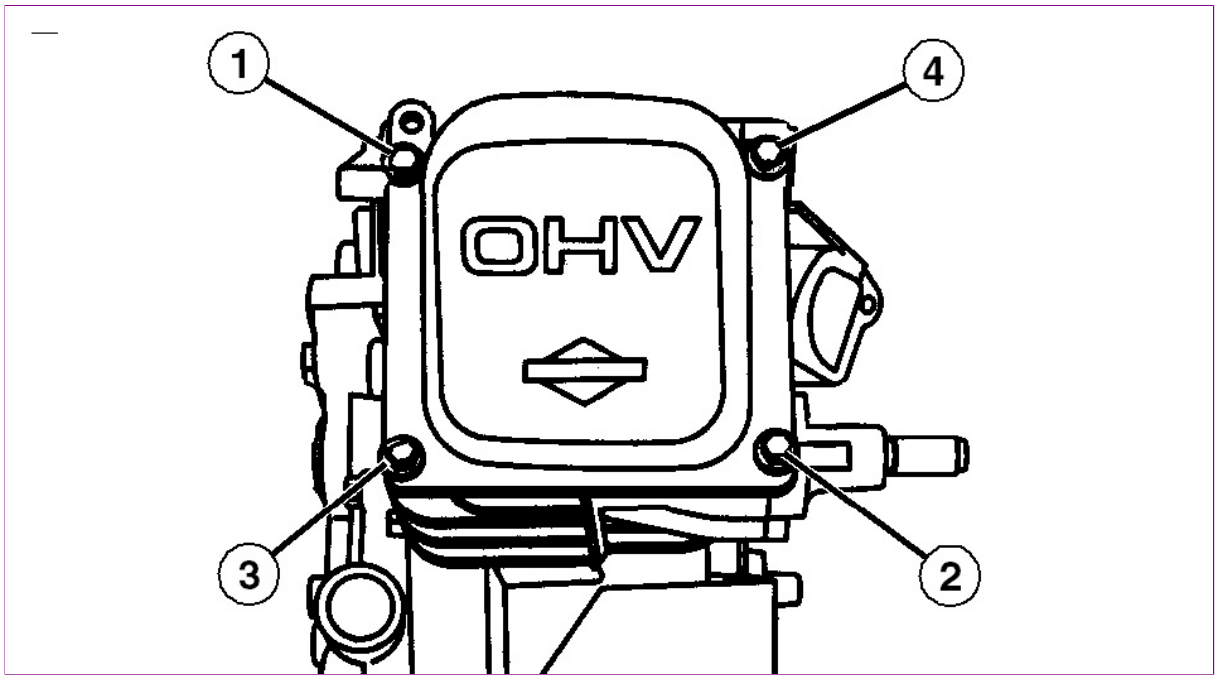
5. Install push rod guide plate (B).
6. *NOTE:*

   The exhaust valve push rod is steel and is marked with a red stripe. The intake valve push rod is aluminum.



Install push rods (E), rocker arm pivots (D), rocker arms (C), and arm support nuts (B). Tighten to specification.

7. Adjust valve clearance. See Valve Clearance Adjustment .



8. Install valve cover with new gasket. Tighten to specification using the crossing pattern shown.
9. Install intake manifold. Tighten to specification.
10. Install blower housing.
11. Install governor control bracket and linkage.
12. Install carburetor and adjust governor linkage. See Governor Adjustment - Static .
13. Install air cleaner assembly.
14. Install spark plug and plug wire.

Item	Measurement	Specification

Specifications:

Head Bolts (Final)	25 N•m 18 lb-ft)
Rocker Arm Screws	17 N•m 150 lb-in.)
Valve Cover Screws	6 N•m 55 lb-in.)
Intake Manifold Bolts	11 N•m 100 lb-in.)

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Cylinder Head Inspection and Repair

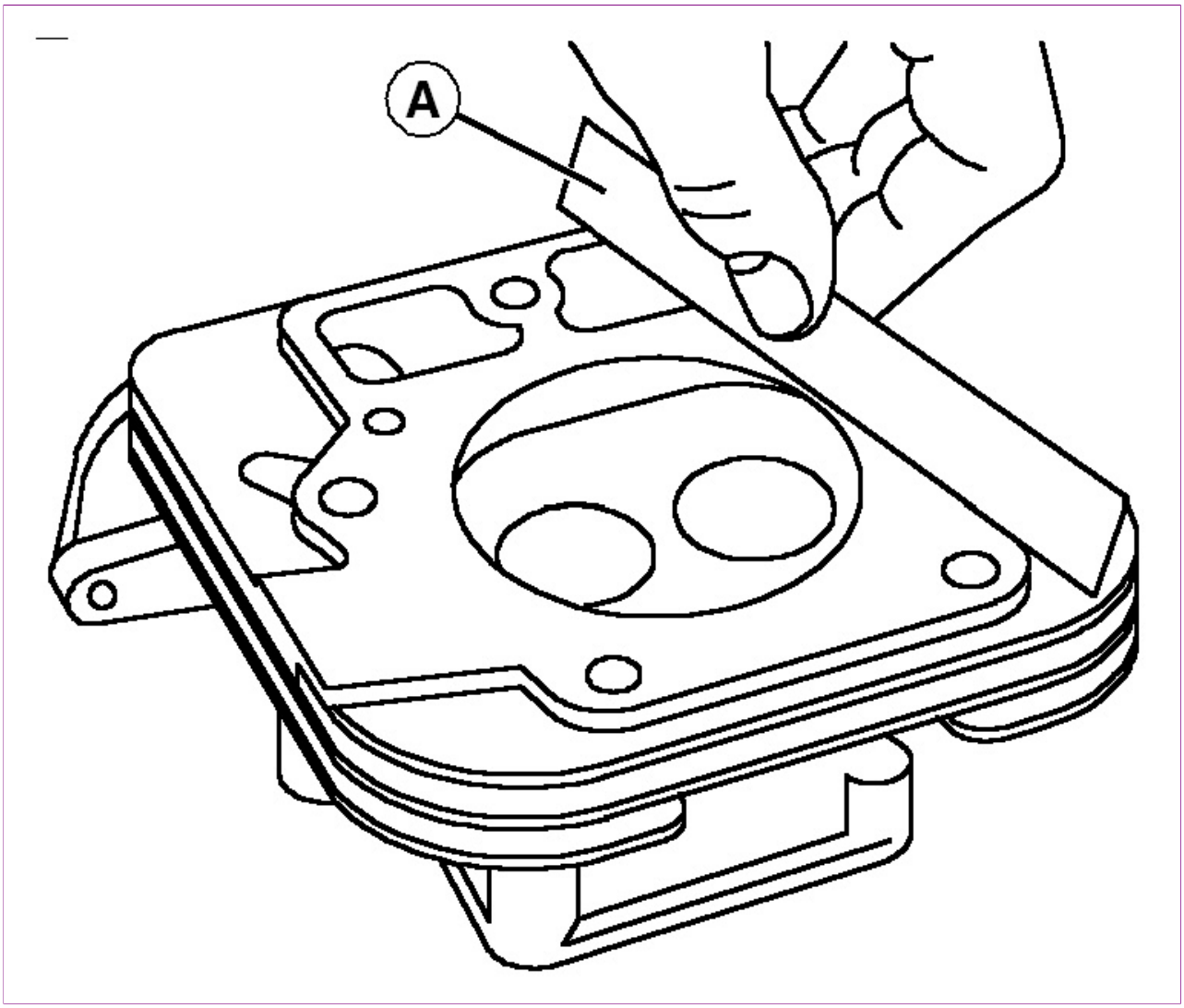
Cylinder Head Inspection and Repair

Procedure:

1. **IMPORTANT:**

   Prevent combustion chamber deposits from entering push rod or oil return cavity in cylinder. Do not damage cylinder, top of piston, cylinder head and cylinder head gasket surfaces. Remove only the combustion chamber deposits. It is not necessary to remove the discoloration marks on the piston, valves and cylinder head. These marks are normal and will not affect engine operation.

   Remove combustion chamber deposits from combustion chamber and around valves using a soft, hand wire brush or scraper. With piston at TDC remove combustion chamber deposits from top of piston.
2. Inspect cylinder head for broken fins or cracks.
3. Remove all gasket material from cylinder head.



4. Using a surface plate or straight edge, check cylinder head mounting surface for distortion in several areas. If mounting surfaces are distorted more than **0.1 mm (0.004 in.)** , replace cylinder head.
5. *NOTE:*

   Valve guides are not serviceable.

Inspect valve guides by inserting plug gauge into valve guide. If plug gauge inserts **6.35 mm (0.250 in.)** or more, the cylinder head must be replaced. If plug gauge is not available, the rejection dimension for both intake and exhaust valve guides is **6.09 mm (0.240 in.)** .

Item	Measurement	Specification
Specifications:		
Maximum Cylinder Head Warpage		0.1 mm 0.004 in.)
Valve Guide Reject Dimension		6.09 mm 0.240 in.)

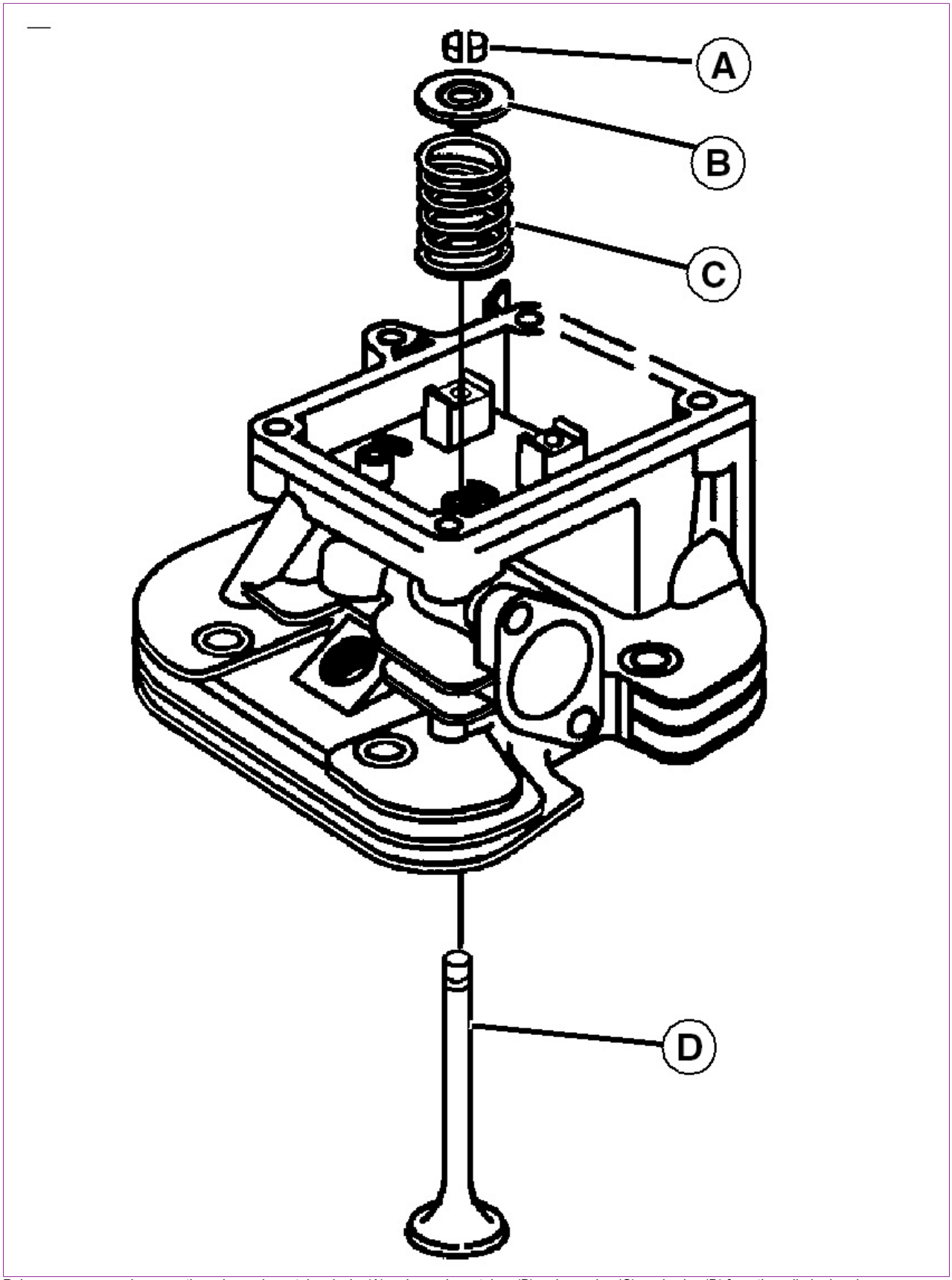
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Valve Removal

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Valve Removal

Procedure:

1. Place cylinder head on workbench with support to hold valves in place.
2. Move rocker arms out of the way and remove valve caps from valve stems.
3. Depress the valve spring retainer and spring with thumbs to compress spring until valve spring retainer locks can be removed.

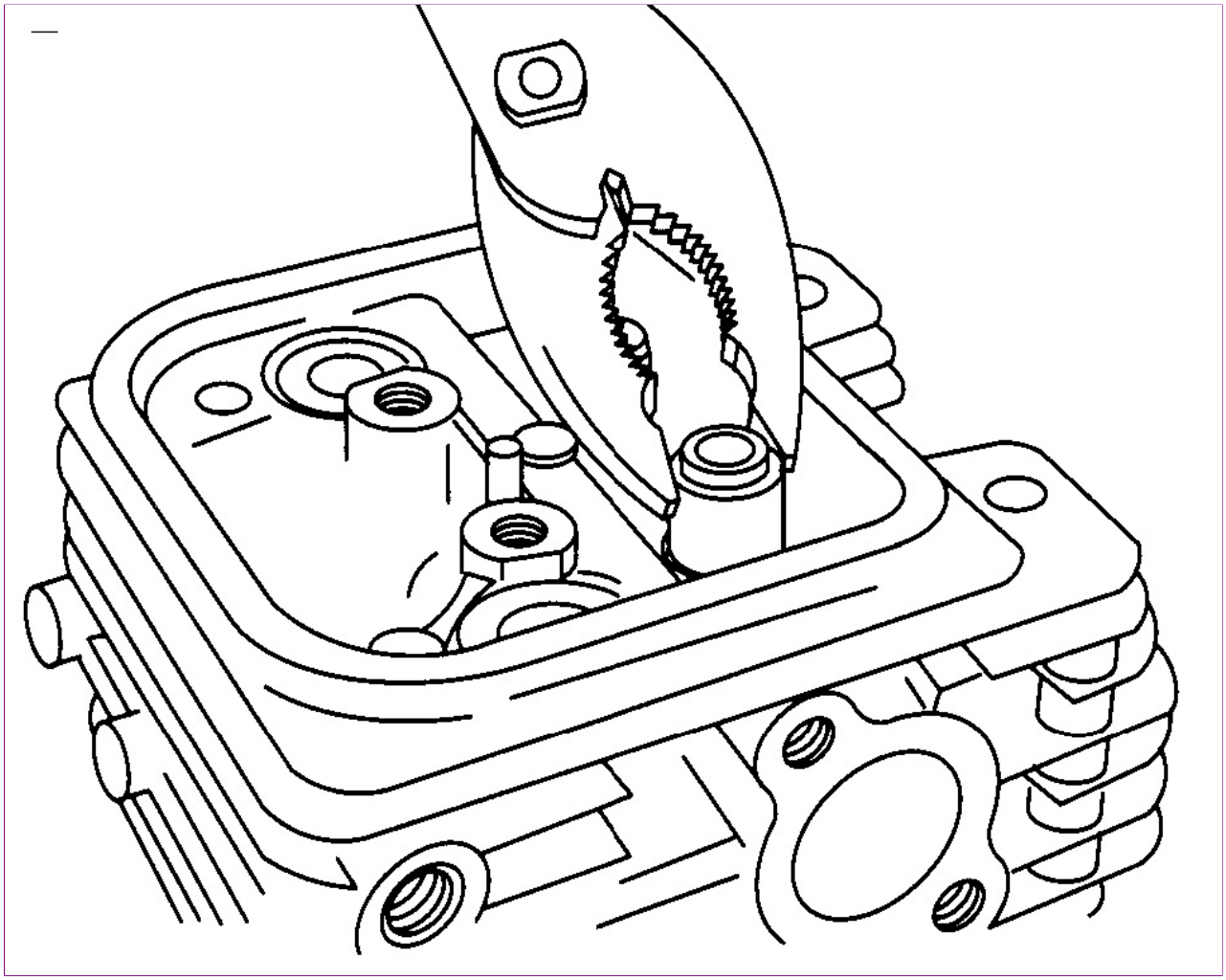


4. Release pressure and remove the valve spring retainer locks (A), valve spring retainer (B), valve spring (C), and valve (D) from the cylinder head.
5. Repeat procedure on other valve.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Valves Reface

Valves Reface

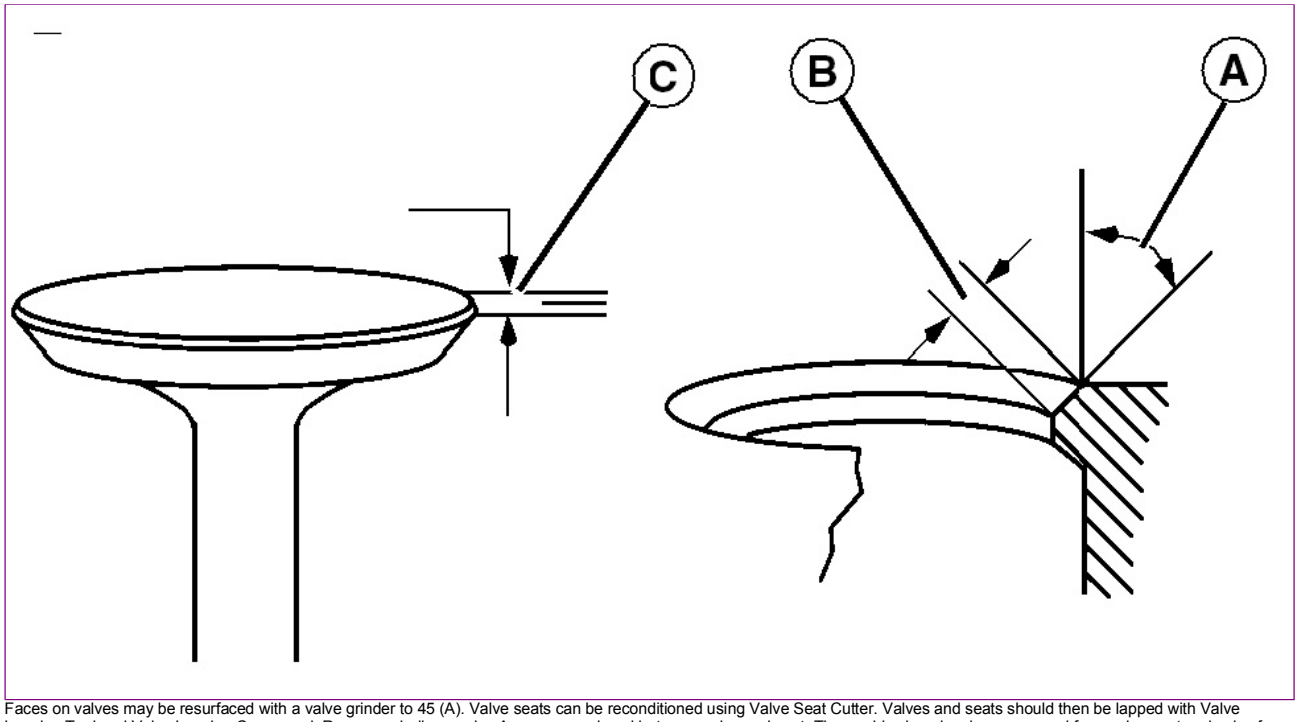
Procedure:



1. **IMPORTANT:**

   Replace valve stem seals whenever valves are removed.

   To remove valve stem seals, grasp seal with pliers and pull up on seal while turning.



2. Faces on valves may be resurfaced with a valve grinder to 45 (A). Valve seats can be reconditioned using Valve Seat Cutter. Valves and seats should then be lapped with Valve Lapping Tool and Valve Lapping Compound. Remove grinding marks. Assure a good seal between valve and seat. Thoroughly clean lapping compound from valve seat and valve face.
3. Valve seat width (B) should be **0.79 - 1.6 mm (0.031 - 0.063 in.)** .
4. If seat is wider, it may be narrowed using Valve Seat Cutter. Use 30 side of cutter to narrow the seats.
5. If the valve is burned it should be replaced. Normal valve margin (C) is **0.8 mm (0.031 in.)** . Replace valve if margin is **0.4 mm (0.016 in.**) or less or if it is burned or damaged. (Valve seats are not replaceable.)
6. Inspect valve springs. Replace if broken or worn.
7. *NOTE:*

   Valve guides are not serviceable.

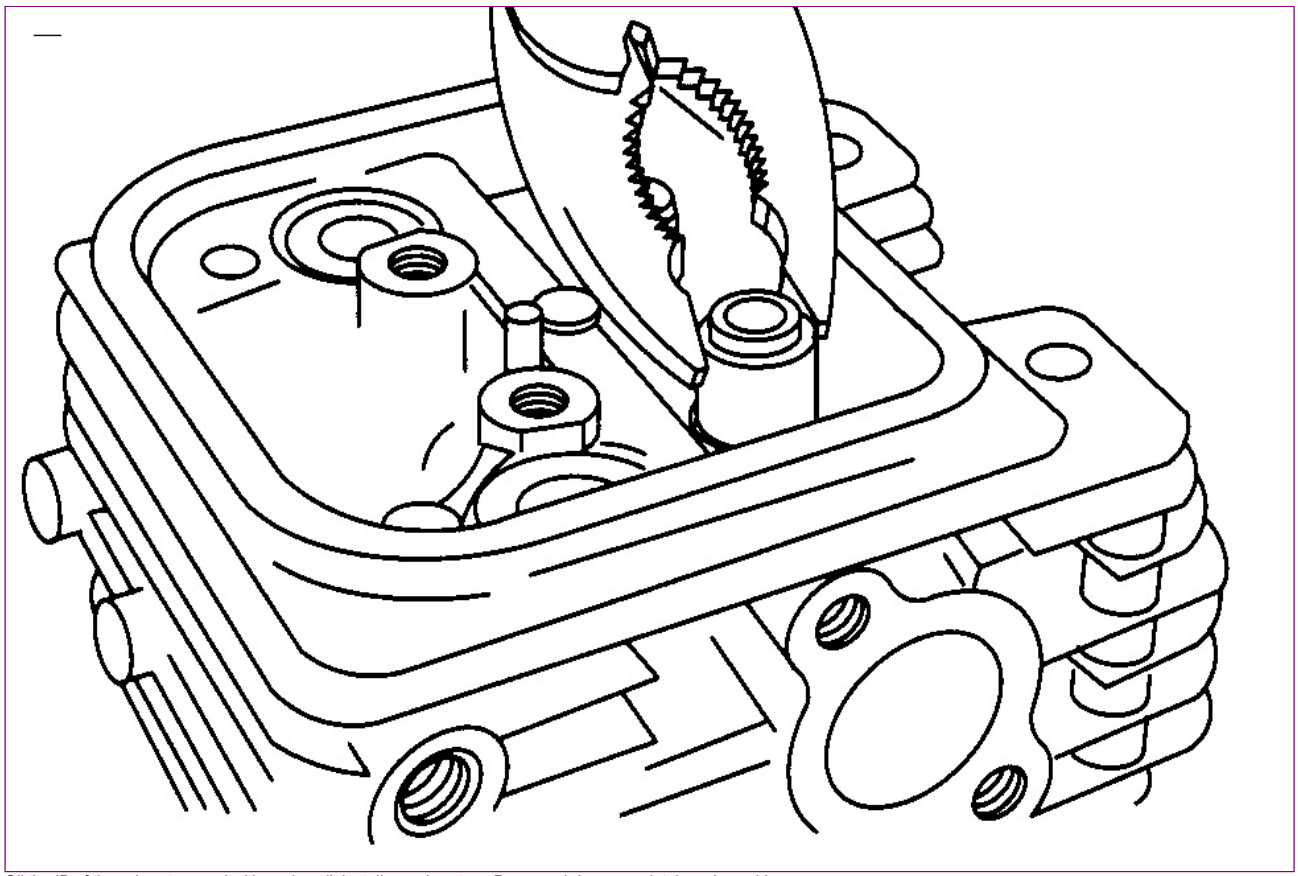
   Inspect valve guides by inserting plug gauge into valve guide. If plug gauge inserts **6.35 mm (0.250 in.)** or more, the cylinder head must be replaced. If plug gauge is not available, the rejection dimension for both intake and exhaust valve guides is **6.09 mm (0.240 in.)** .

Item	Measurement	Specification
Specifications:		
Valve Seat Width		0.79 - 1.6 mm 0.031 - 0.063 in.)
Valve Margin (minimum)		0.4 mm 0.016 in.)
Valve Guide Reject Dimension (both)		6.09 mm 0.240 in.)
Valve Face Angle		45
Valve Narrowing Angle		30

Valves Installation

Procedure:

1. If rocker arm studs were removed, coat with hardening sealant before installation.
2. Install rocker arm studs. Tighten to **17 N•m (150 lb-in.)** .
3. Valve stems and guides must be free of foreign material and burrs or valve sticking will occur, damaging the valve stem seals.



4. Oil the ID of the valve stem seal with engine oil. Install on valve stem. Press seal down over intake valve guide.
5. *NOTE:*

   Be sure valve guide lubricant is not on valve face, valve seat, or exposed end of valve stem.

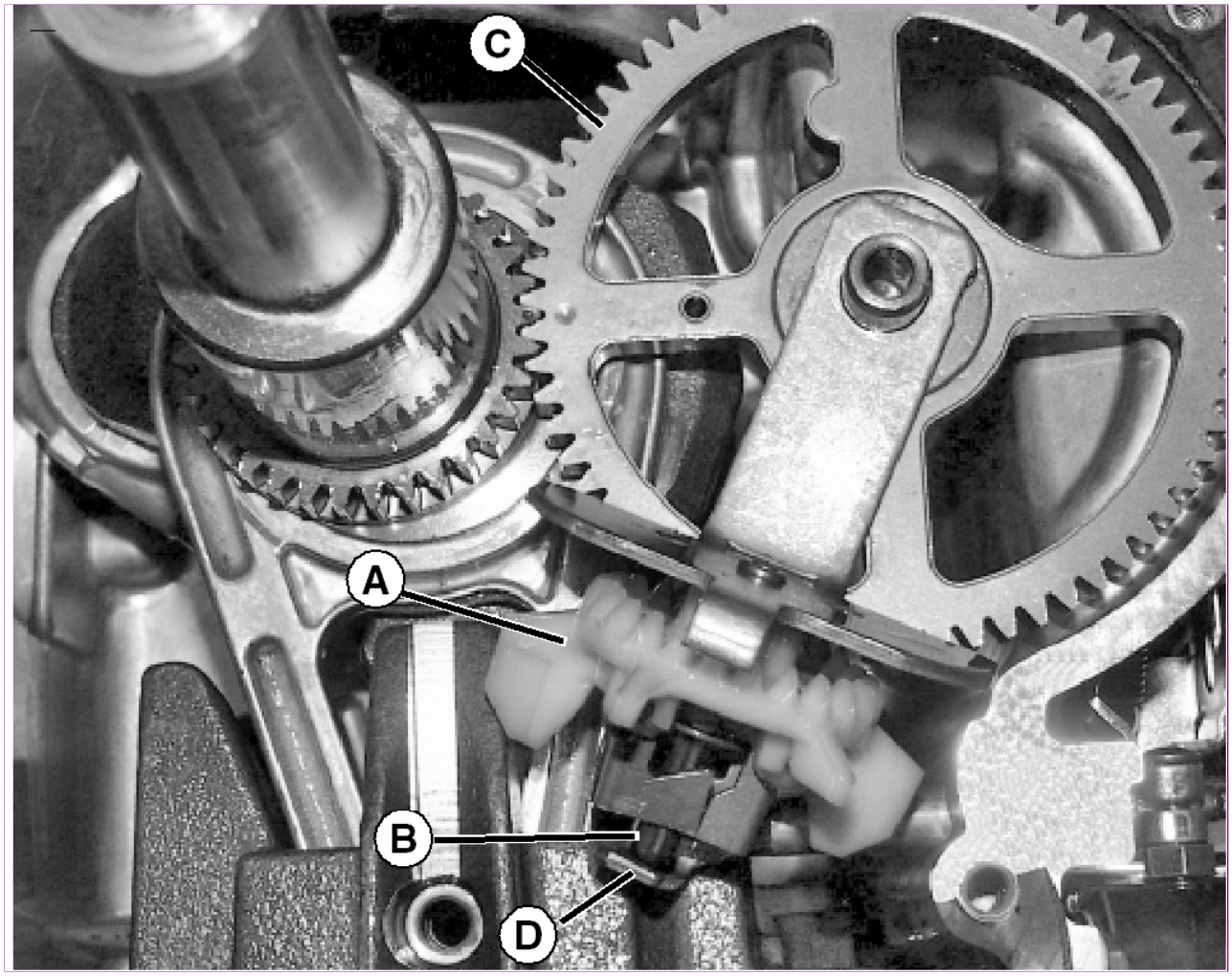
   Lightly coat valve stems with valve guide lubricant. Install valve into valve guide.
6. Place valve spring over valve stem.
7. Place retainer on spring.
8. Compress valve spring with thumbs until valve stem extends through end of retainer. Continue to press until the valve spring retainer locks can be put into the groove on the valve stem. Be sure locks are fully engaged in valve stem groove.
9. Gradually release pressure on the valve spring until the retainer locks seat into the retainer.
10. Install cylinder head on engine block. See Cylinder Head Removal and Installation .
11. Set valve clearance. See Valve Clearance Adjustment .

Item	Measurement	Specification
Specification:		
Rocker Arm Studs		17 N•m 150 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Governor Removal and Installation

Governor Removal and Installation

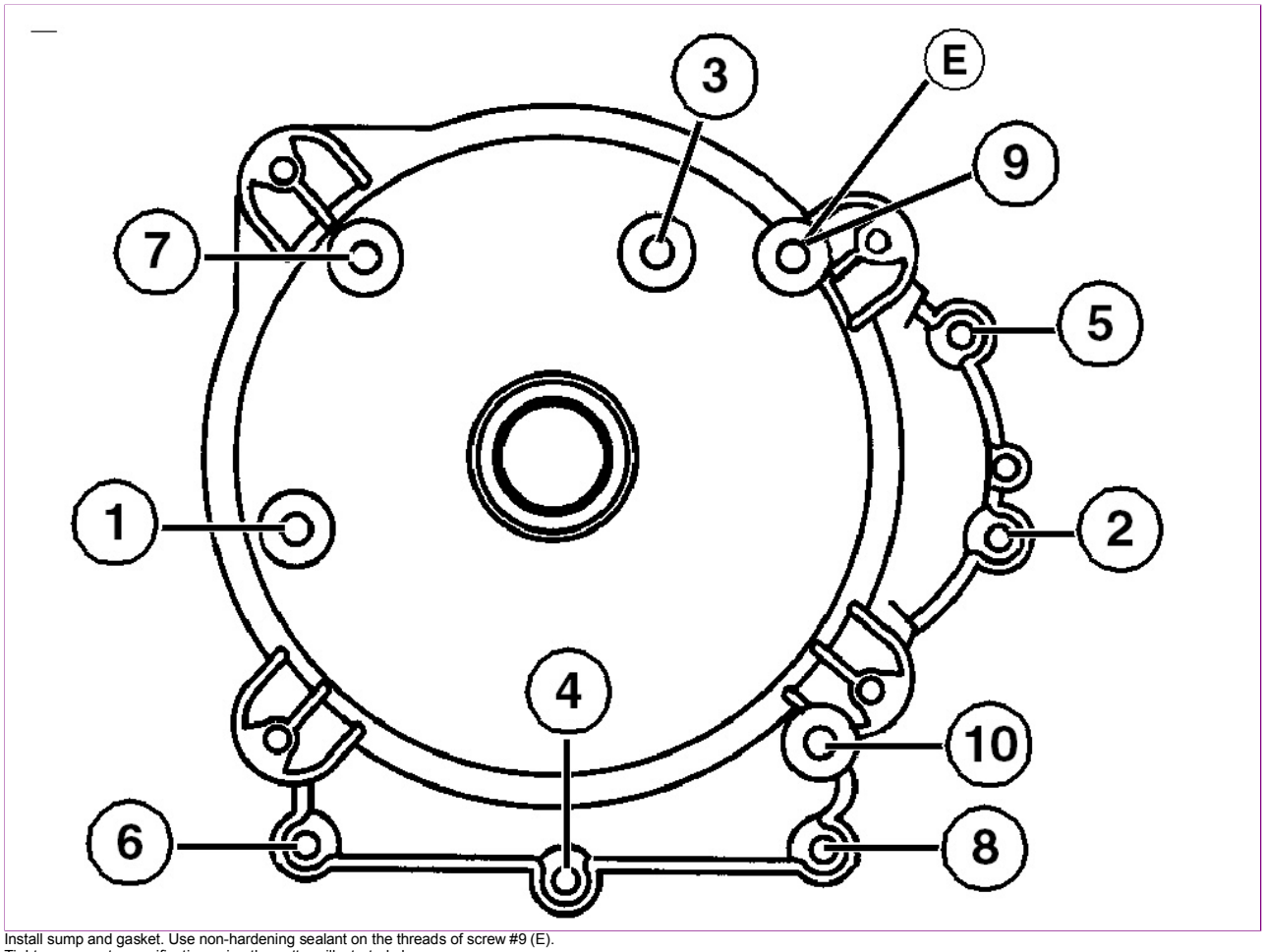
Procedure:

1. Drain oil from crankcase.
2. Remove all rust, foreign material and burrs from crankshaft.
3. Remove crankcase screws. Remove crankcase and gasket.
4. 

LEGEND:

   A - Oil Slinger/Governor Gear Assembly
   B - Governor Cup
   C - Cam Gear
   D - Governor shaft Paddle

   Lift governor assembly off of camshaft.
5. Inspect governor gear and bearing, flyweight pivots, and governor cup for wear or damage.
6. Before installing sump, be sure that governor cup is in line with governor shaft paddle.



7. Install sump and gasket. Use non-hardening sealant on the threads of screw #9 (E).
8. Tighten screws to specification using the pattern illustrated above.
9. Complete installation of remaining governor linkage and carburetor.
10. Adjust governor. See Governor Adjustment - Static .

Item	Measurement	Specification
Specification:		
Sump Cover		20 N•m 180 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Piston, Rings and Rod

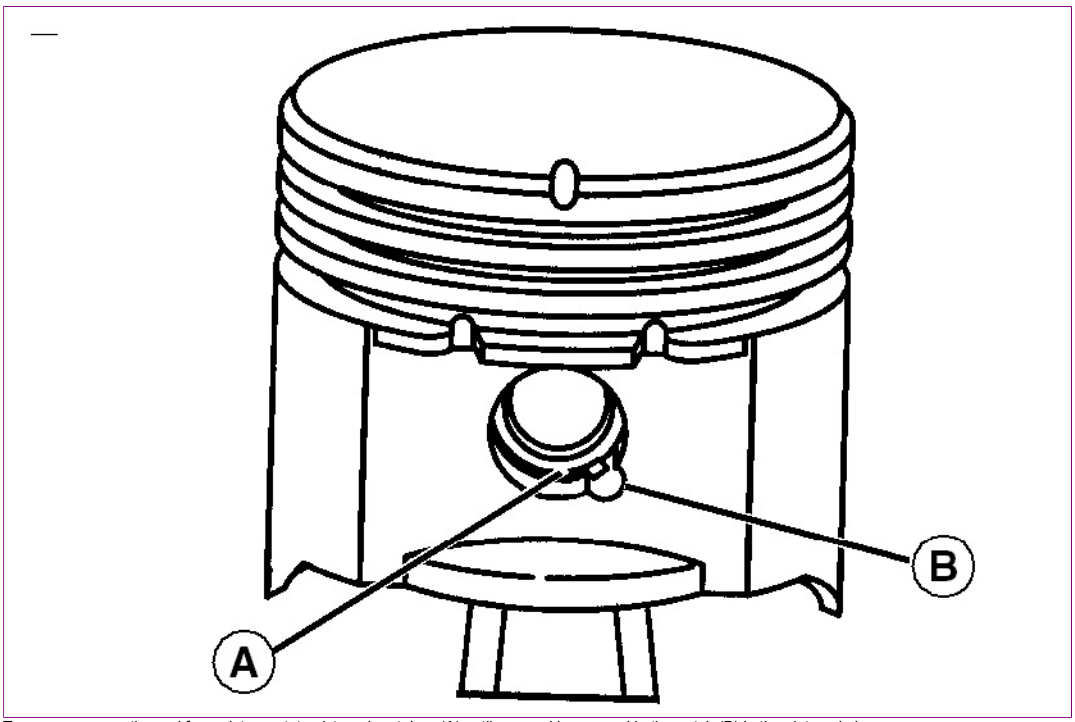
Piston, Rings and Rod

Procedure:

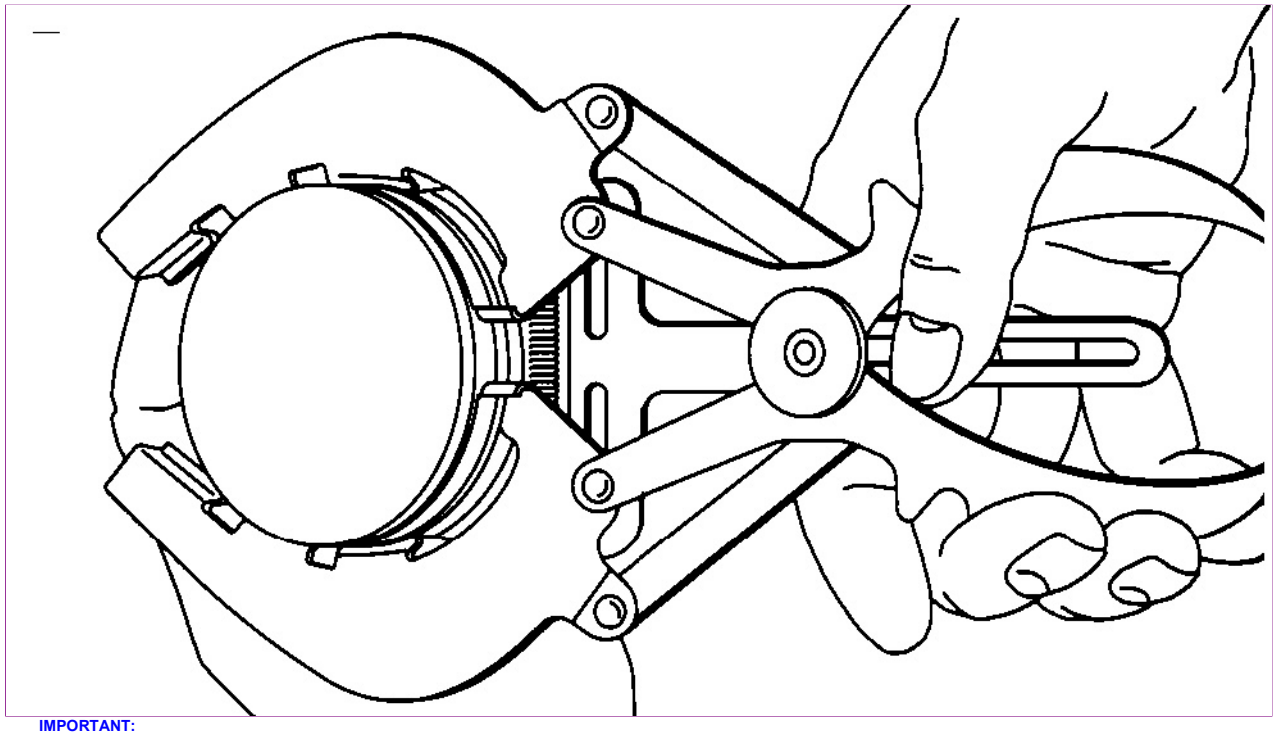
1. Remove air filter and bracket, upper blower housing, flywheel, alternator, carburetor and governor linkage.
2. *NOTE:*

   Remove carbon or ridge at the top of the cylinder bore. This will prevent breaking the rings when removing the piston and connecting rod.

   Remove starter, cylinder head and crankcase cover.
3. Remove the connecting rod cap. Then push the piston and connecting rod out through the top of the cylinder.



4. To remove connecting rod from piston, rotate piston pin retainer (A) until one end is exposed in the notch (B) in the piston pin bore.
5. With a needle nose pliers, grasp end of piston pin retainer. Pull in and up to remove.
6. From opposite side of piston, push piston pin out of piston and connecting rod. Piston pin is a push fit in piston and rod. Deposits may build up on piston pin and require the piston pin to be pressed out.



7. **IMPORTANT:**

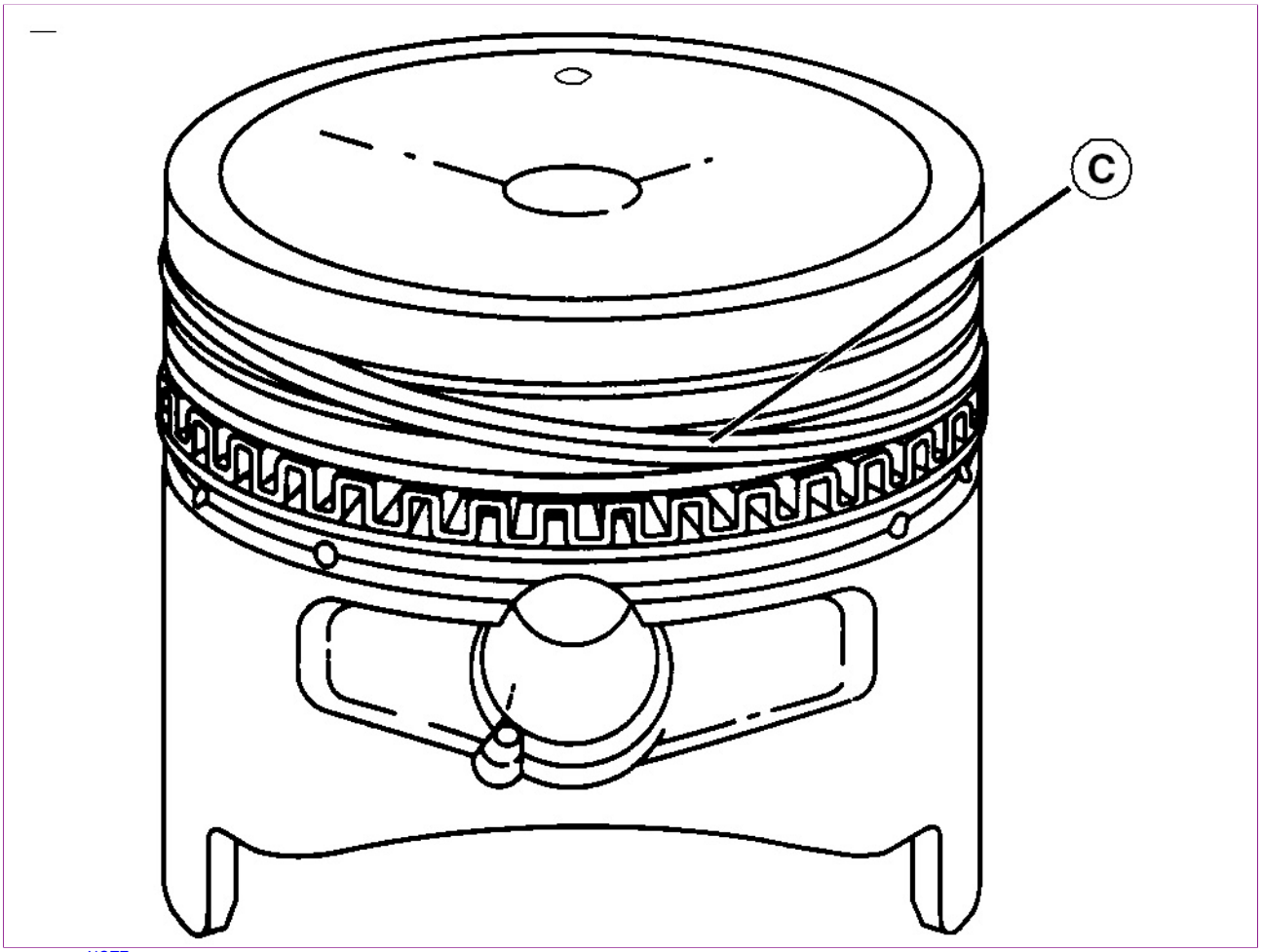
   New piston rings must be installed whenever the engine is disassembled for major servicing or overhaul, providing that cylinder bore is within specifications.

   Remove top and center compression rings using ring expander.

8. *NOTE:*

   Measure cylinder bore before checking piston and rings. If cylinder bore requires re-sizing, it will not be necessary to check piston and rings since a new oversized piston assembly will be used.

   If cylinder bore is more than **0.08 mm (0.003 in.)** oversize, or **0.04 mm (0.002 in.)** out of round, it must be resized.



9. *NOTE:*

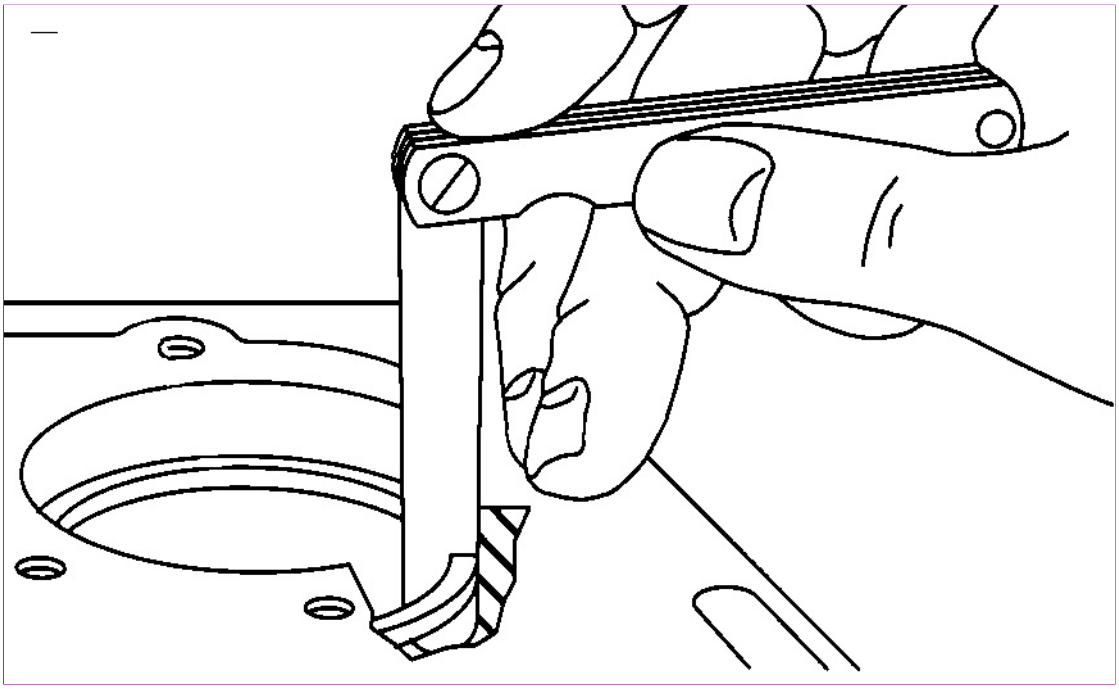
   Oil control ring (C) is shown being spiraled into compression ring groove.

   Spiral top oil control ring from oil ring groove into center compression ring groove. Repeat into top compression ring groove, and then off piston. Repeat for bottom oil control ring.

10. *NOTE:*

    If the cylinder is not to be resized and the piston shows no signs of wear or scoring, replace only the piston rings.

    Insert old rings one at a time approximately **25.4 mm (1.0 in.)** down into the cylinder bore.

11. 

CAUTION:

Wear gloves or cover rings with a rag. The top and bottom edges of the ring may be extremely sharp. Personal injury could occur. Never reuse worn piston rings.

12. Check ring end gap with feeler gauge. If ring gap is greater than **0.64 mm (0.025 in.)** for the top compression ring and **0.76 mm (0.030 in.)** for the center compression ring and the oil ring, the ring is worn and should be replaced.

NOTE:

Before installing new piston rings, recondition the cylinder using a rigid hone with finishing stones. This will restore the cross hatch angle in the cylinder bore. The correct cylinder cross hatch ensures proper lubrication and piston ring rotation.

A worn ring will usually show scratches caused by abrasives and/or have a shiny appearance. Never reuse worn piston rings.

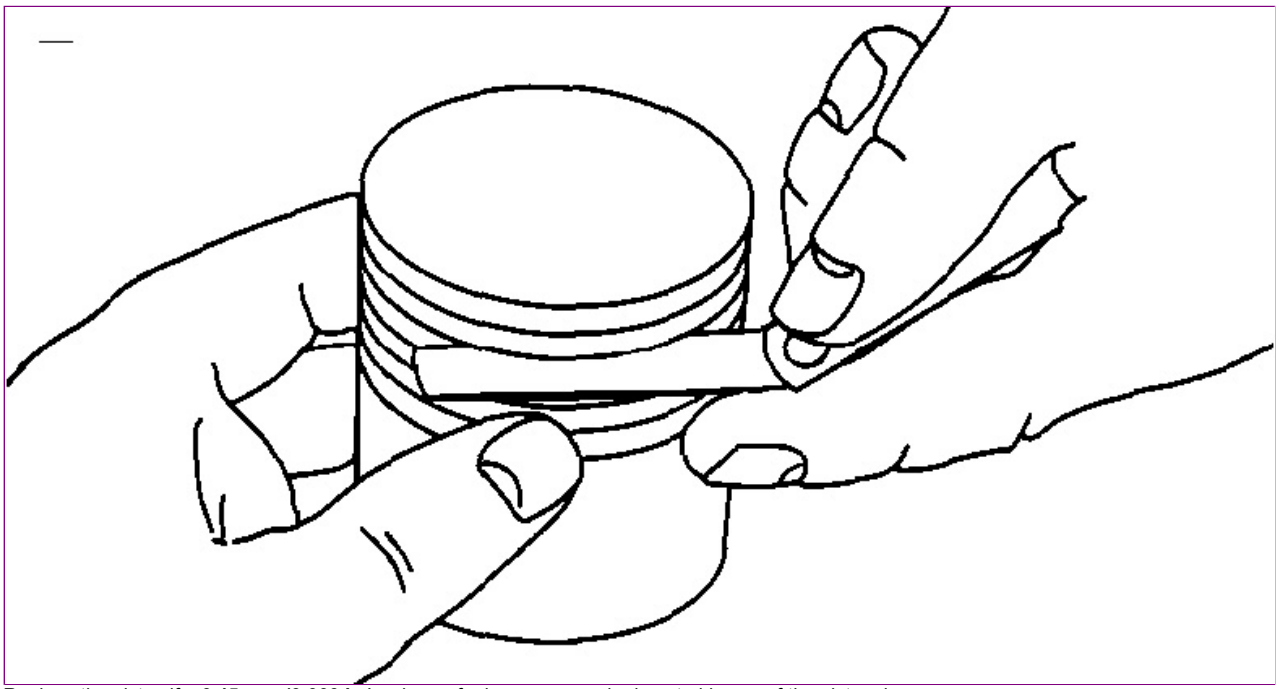
Item	Measurement	Specification
Specifications:		
Cylinder Out of Round (maximum)		0.04 mm 0.002 in.)
Cylinder Oversized (maximum)		0.08 mm 0.003 in.)
Ring End Gap (maximum) Top Compression		0.64 mm 0.025 in.)
Center Compression		0.76 mm 0.030 in.)
Oil Control		0.76 mm 0.030 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Piston Inspection

Piston Inspection

Procedure:

1. Clean carbon from top two ring grooves.
2. Place a new ring in each piston groove.

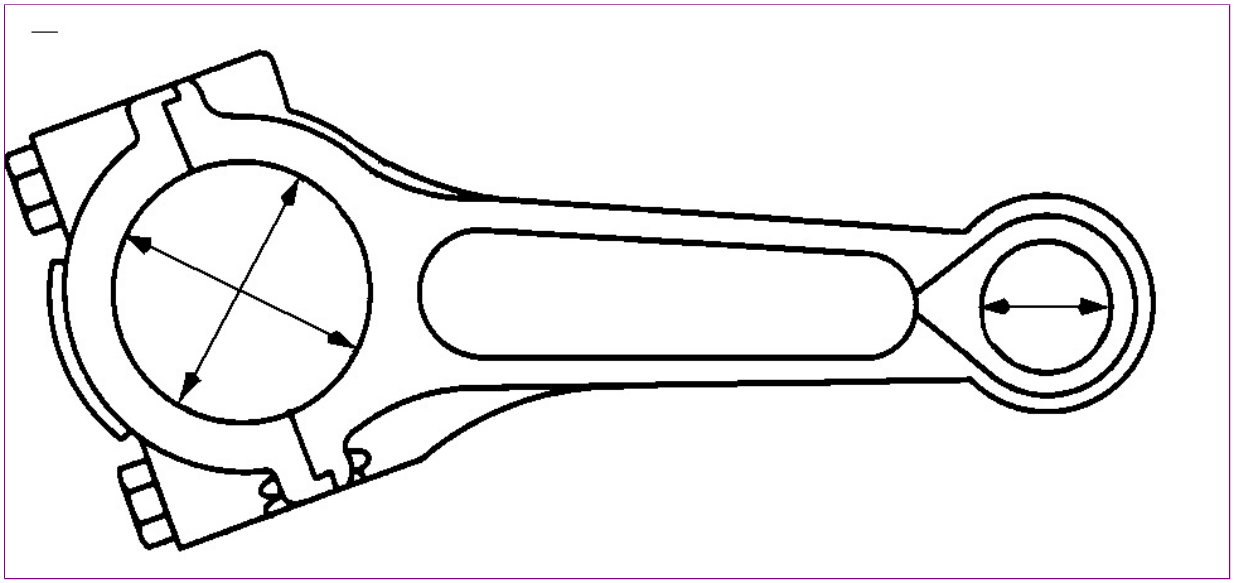


3. Replace the piston if a **0.15 mm (0.006 in.)** or larger feeler gauge can be inserted in any of the piston ring grooves.

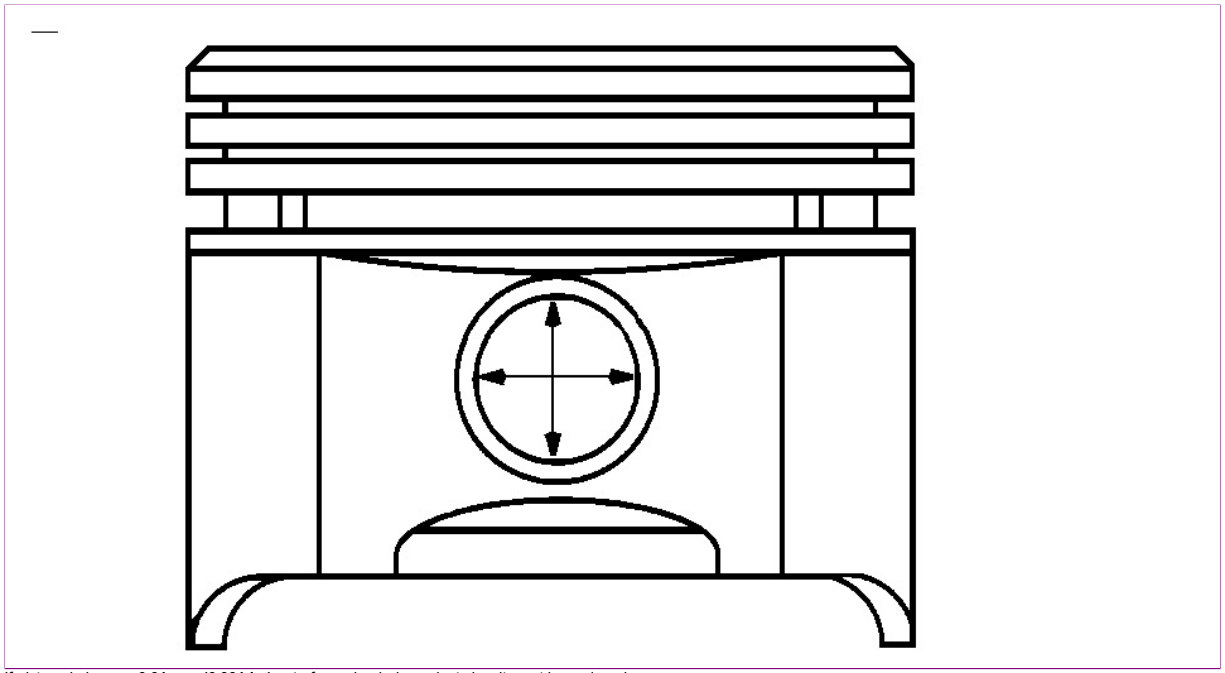
Item	Measurement	Specification
Specification:		
Ring Groove Clearance (maximum)		0.15 mm 0.006 in.)

Connecting Rod Inspection

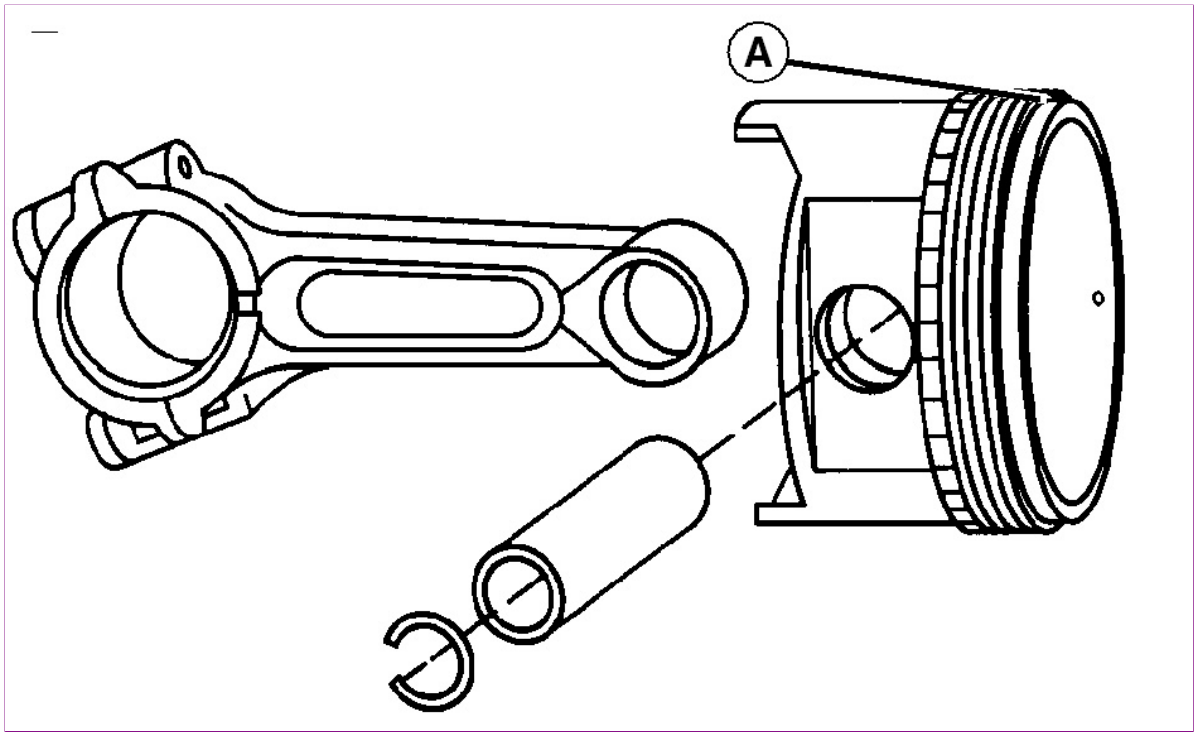
Procedure:



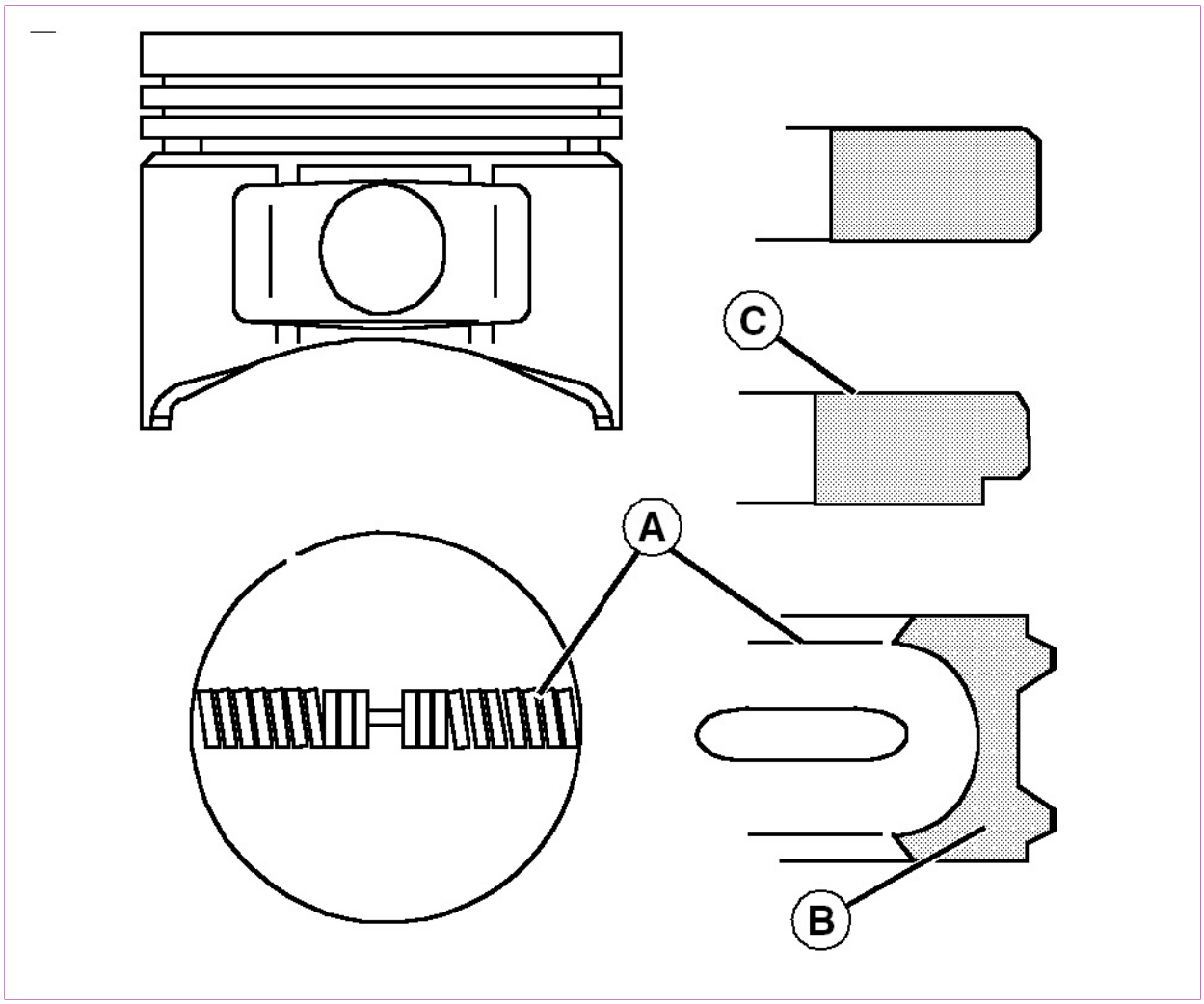
1. If the crankpin bearing in the connecting rod is scored, the rod must be replaced. Reject size of crankpin bearing and piston pin bearing can be found at the end of this procedure.
2. Replace connecting rod if either bore is worn.



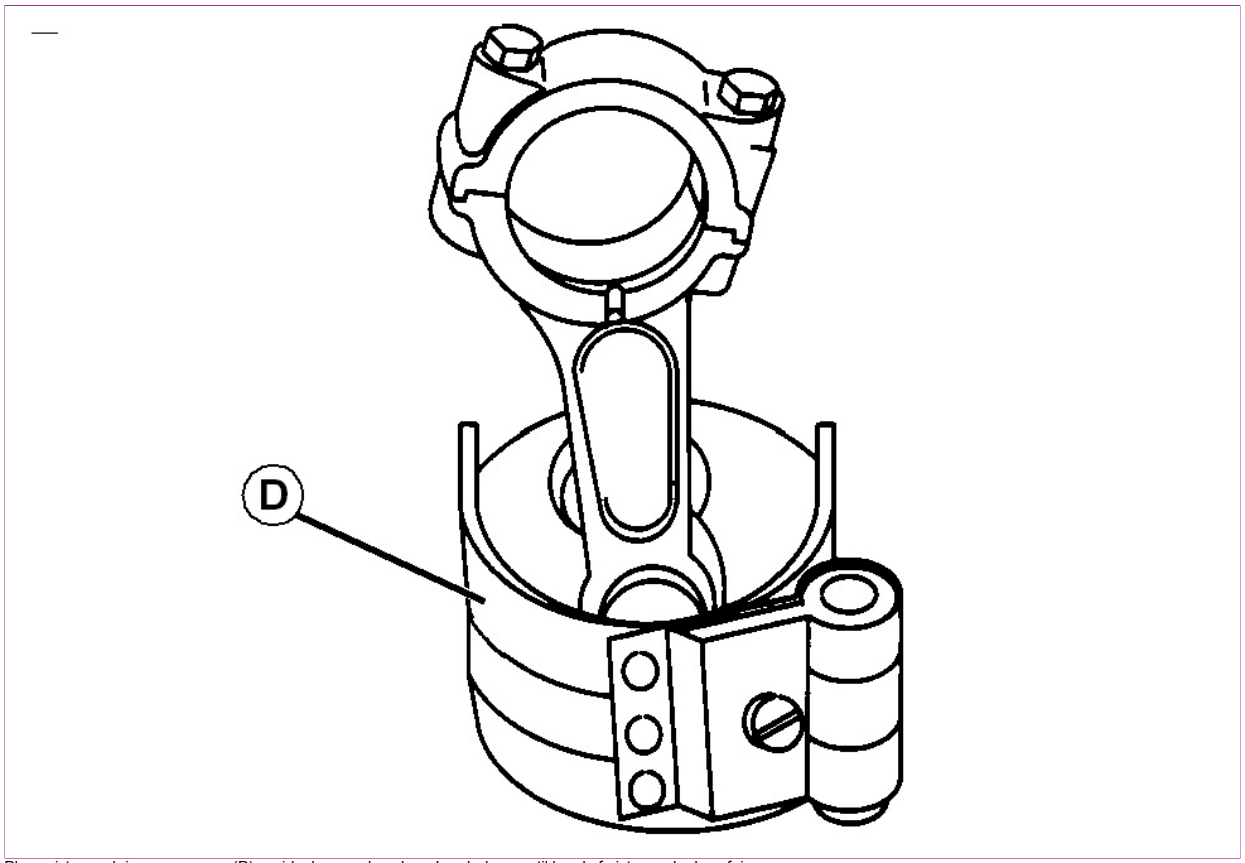
3. If piston pin is worn **0.01 mm (0.001 in.)** out of round or below reject size, it must be replaced.
4. The piston pin is a slip fit in both the piston and the connecting rod. Reject size of piston pin can be found at the end of this procedure.
5. Install a piston pin lock in groove on one side of piston.



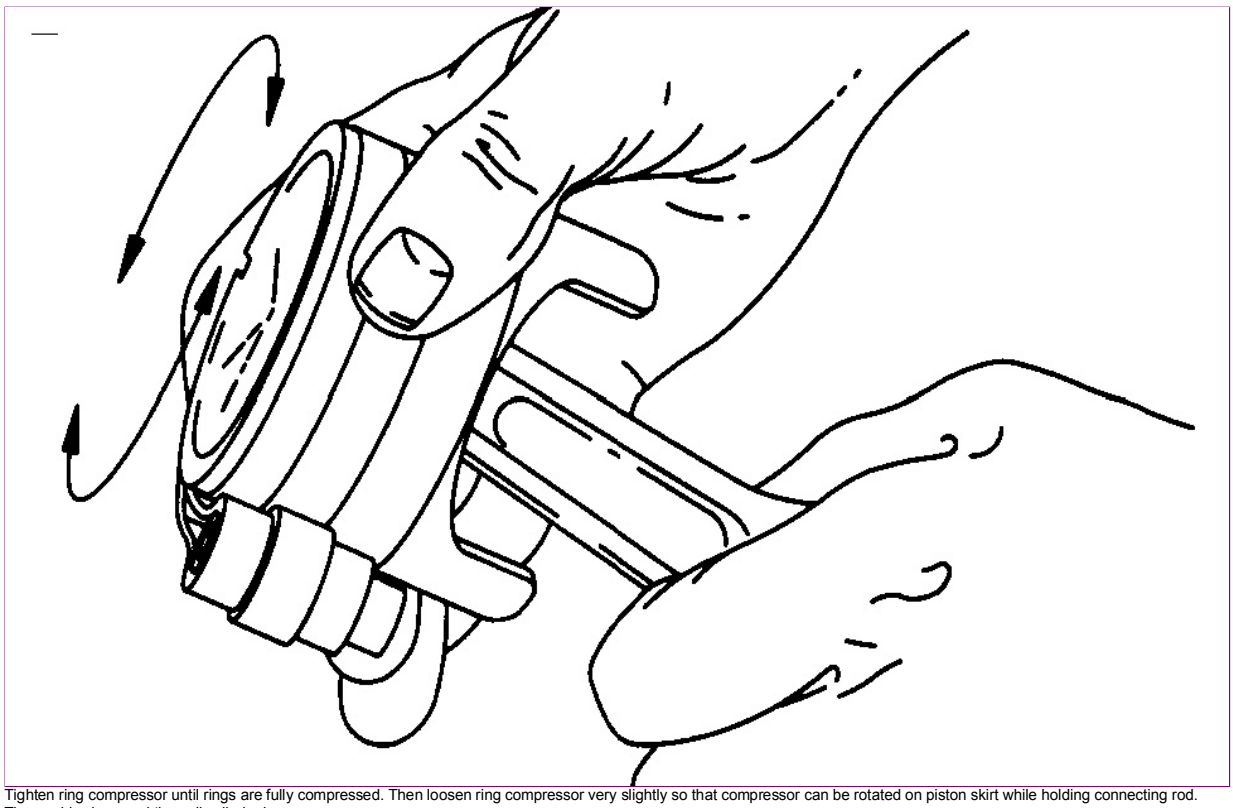
6. Piston must be installed with notch or arrow (A) toward flywheel side of cylinder. Dot on piston can face either direction.
7. Insert piston pin from opposite side of piston until pin stops against piston pin lock. Then install other piston pin lock. Be sure both locks are seated in grooves.



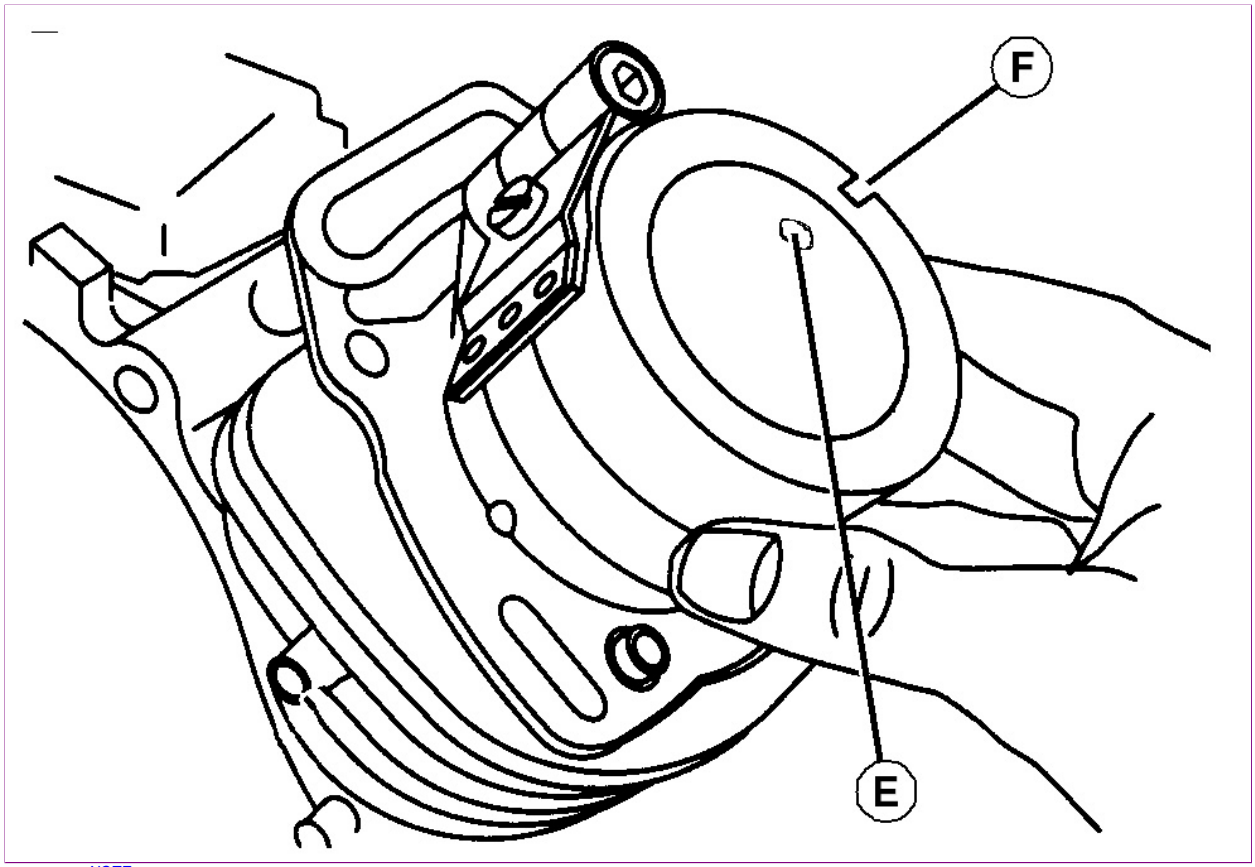
8. Install oil ring expander coil spring (A) first. Spiral the oil control ring (B) into top ring groove, then into second ring groove and finally into position over the expander.
9. Position gap of oil ring expander coil spring approximately **180** from oil control ring.
10. The correct piston ring positions are shown above. The second (C) compression ring is installed with “ID” mark toward top of piston.
11. Using ring expander, install center compression ring then top compression ring as shown above.
12. Apply oil to piston rings and piston skirt.



13. Place piston and ring compressor (D) upside down on bench and push down until head of piston and edge of ring compressor are even.



14. Tighten ring compressor until rings are fully compressed. Then loosen ring compressor very slightly so that compressor can be rotated on piston skirt while holding connecting rod.
15. Thoroughly clean and then oil cylinder bore.

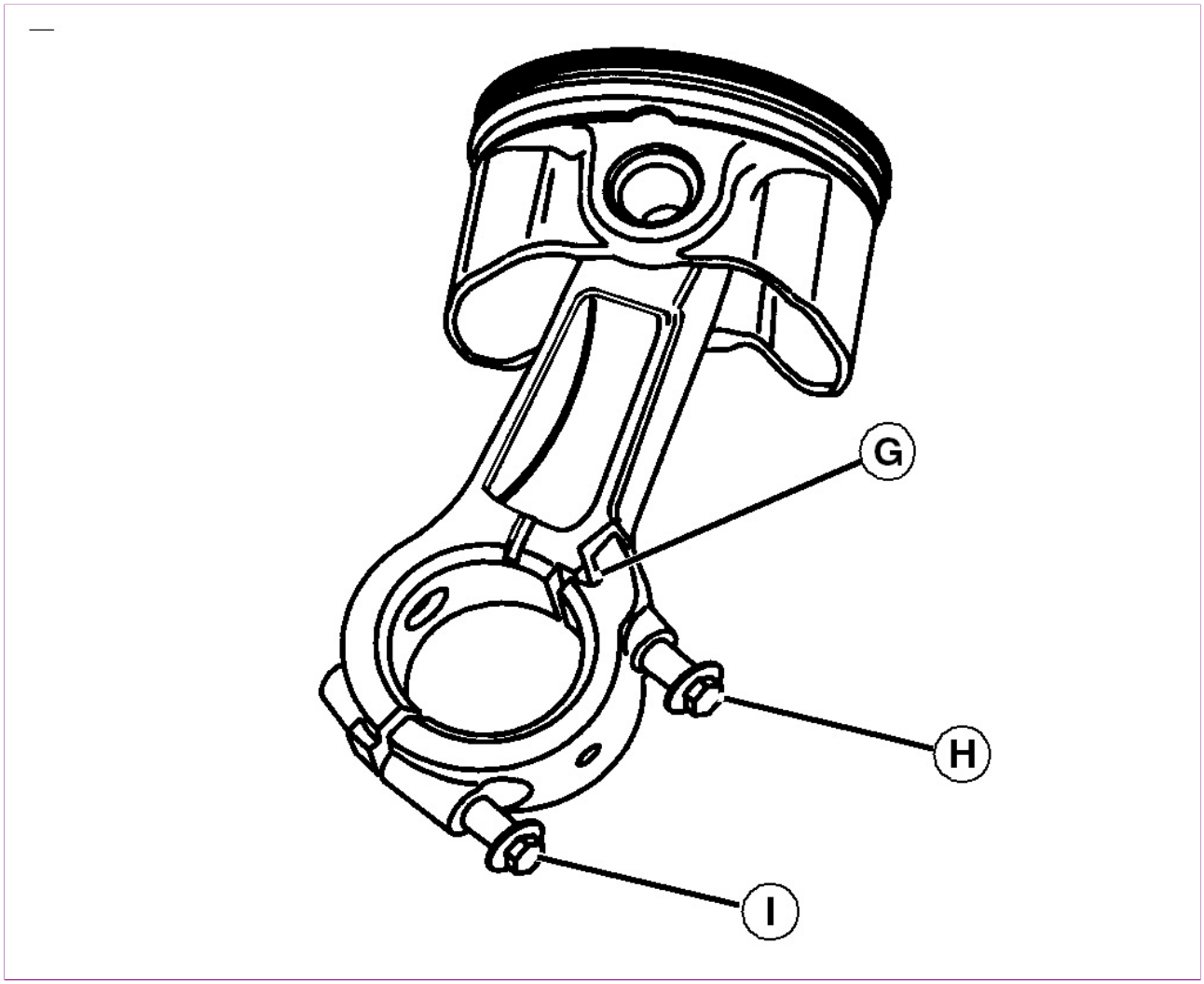


16. *NOTE:*

The pistons have offset piston pin bores. Position the notch or arrow (E) on piston is facing toward the flywheel side (F) of engine.

Rotate crankshaft until crankpin journal is at bottom of stroke. This permits complete entry of compressed rings, piston and rod assembly, when pushed into cylinder.

17. Clean and oil crankshaft crankpin.
18. Pull connecting rod against crankpin.



19. Install rod cap with the notch in the connecting rod (G) engaged to the tab on the connecting rod.
20. **IMPORTANT:**

    The connecting rod screws MUST be tightened in the sequence listed. Failure to use a torque wrench in the correct sequence can result in breakage or scoring.

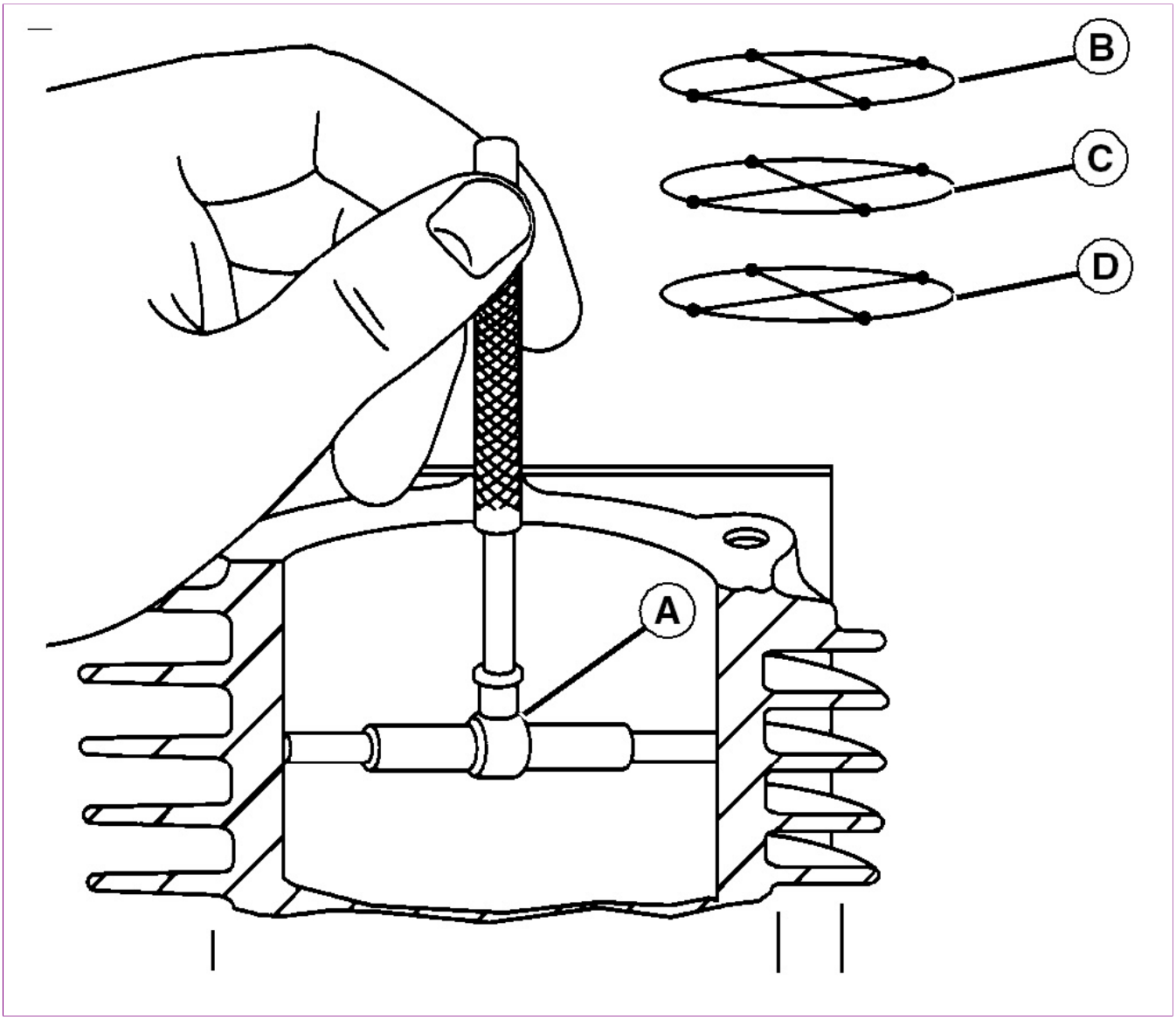
    Install connecting rod screws. Tighten the screw closest to the piston (H) first, the screw farthest from the piston (I) second.
21. Rotate crankshaft two revolutions to check for binding. Rod should also be free to slide sideways on crankpin.

Item	Measurement	Specification
Specifications:		
Crankpin Bearing		38.15 mm 1.502 in.)
Piston Pin		20.29 mm 0.799 in.)
Piston Pin Bore		20.35 mm 0.801 in.)
Piston Pin Wear (maximum)		0.01 mm 0.001 in.)
Connecting Rod Screws		17 N•m 150 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Bore Inspection

Cylinder Bore Inspection

Procedure:



1. Always inspect cylinder after engine has been disassembled. Visual inspection will show if there are any cracks, stripped bolt holes, broken fins or if the cylinder walls are damaged. Use a telescoping gauge (A) and dial caliper, or an inside micrometer to determine the size of the cylinder bore. Measure at right angles at six points: top (B), center (C), and bottom (D).
2. If the cylinder bore is more than **0.08 mm (0.003 in.)** oversize, or **0.04 mm (0.002 in.)** out of round, it must be resized, or replaced. See See Resizing Cylinder Bore .
3. If cylinder bores are within specification and show no signs of scoring or other damage, new pistons rings may be installed providing the cylinder bores are reconditioned to restore the proper cross hatch angle in the cylinder bores. The proper cylinder cross hatch ensures proper lubrication and piston ring rotation.

Item	Measurement	Specification
Specifications (31P677):		
Standard Bore Size (minimum)		90.47 mm 3.562 in.)
Standard Bore Size (maximum)		90.51 mm 3.563 in.)

Item	Measurement	Specification
Specifications (331877):		

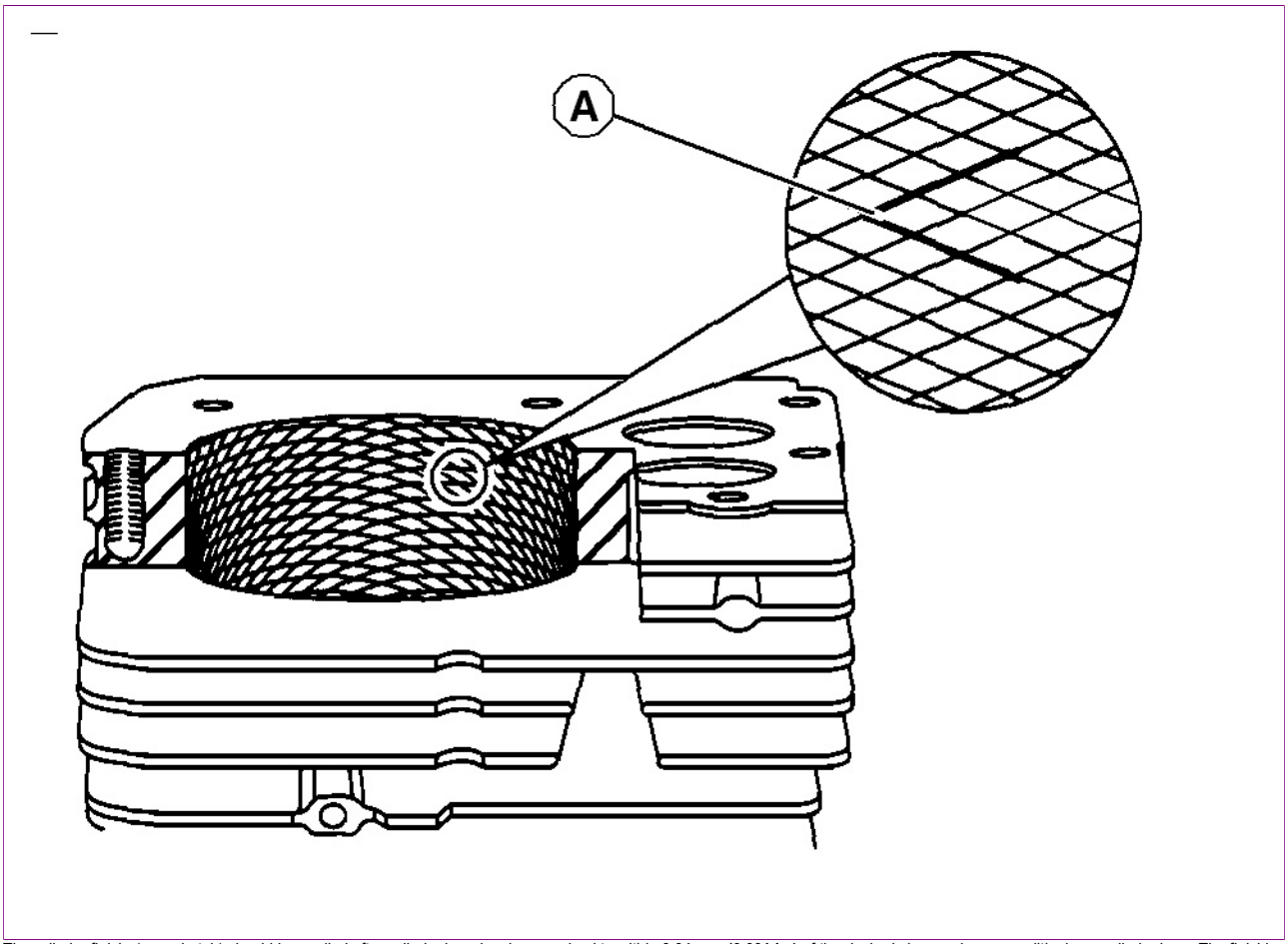
Standard Bore Size (minimum)	94.02 mm 3.702 in.)
Standard Bore Size (maximum)	94.06 mm 3.703 in.)

Cylinder Bore Honing

Procedure:

1. *NOTE:*

   To produce the proper cross hatch finish use a drill speed of approximately 200 rpm and 40 - 60 strokes per minute. Lubricate hone liberally to prevent build up on finishing stones.



   The cylinder finish, (cross hatch) should be applied after cylinder bore has been resized to within **0.04 mm (0.001 in.)** of the desired size or when reconditioning a cylinder bore. The finishing stones will produce the correct cross hatch needed for proper lubrication and piston ring rotation. The correct cross hatch angle is approximately 45 (A).
2. Recondition the cylinder bores to restore the cross hatch finish when new piston rings are to be installed in a cylinder that is within specification. Be careful not to hone oversize or it will be necessary to resize the cylinder.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Bore Cleaning

Cylinder Bore Cleaning

IMPORTANT:

Ensure that the entire cylinder and crankcase are thoroughly cleaned after honing. First wash the cylinder and crankcase carefully in a solvent such as kerosene. Then thoroughly wash cylinder and crankcase using a stiff brush with soap and hot water, Rinse thoroughly with hot running water. Repeat washing and rinsing until all traces of honing grit are gone. Honing grit is highly abrasive and will cause rapid wear to all of the internal components of the engine unless it is completely removed.

Procedure:

1. When cylinder and crankcase have been thoroughly cleaned, use a clean white rag or napkin and wipe the cylinder bore. If honing grit is present it will appear as a gray residue on rag. If any honing grit is evident, re-wash and rinse entire cylinder and crankcase and check again. When there is no trace of honing grit on rag, the cylinder is properly cleaned. Then oil cylinder bore to prevent rusting.

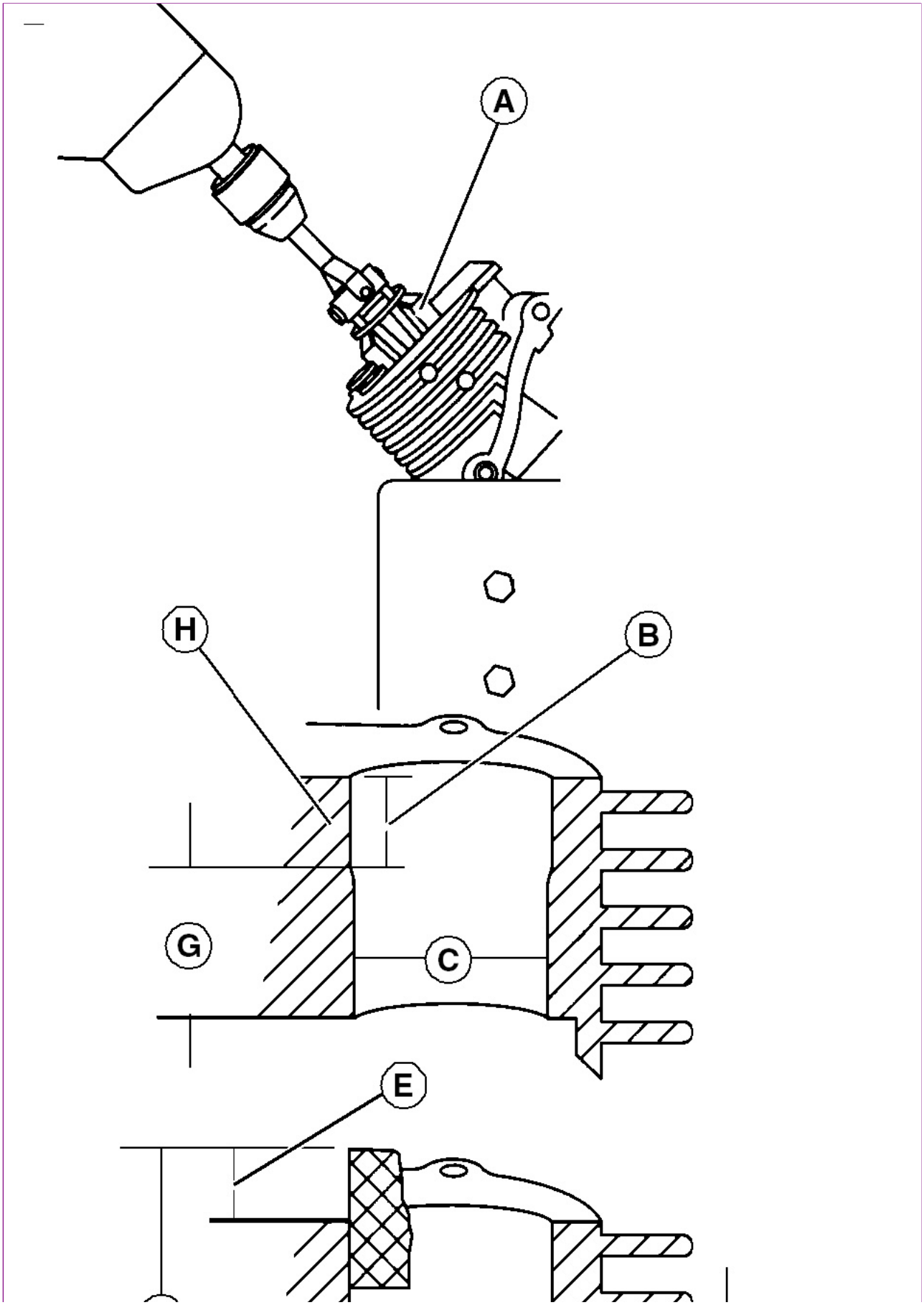
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Resizing Cylinder Bore

Procedure:

1. If the cylinder bore is not within specifications, it will have to be resized using a boring bar or hone. Resize to exactly **0.51 mm (0.020 in.)** over standard size.
2. If this is done accurately, the oversize rings and pistons will fit correctly and proper clearances will be maintained.
3. **IMPORTANT:**

   If a boring bar is used, a hone must be used after the boring operation to produce the proper cylinder cross hatch. See “Cylinder Bore Honing” above.


A
H
B
G
C
E

If a hone is used to resize the cylinder bore, place hone (A) in middle of cylinder bore (C). Tighten adjusting knob with finger until stones fit snugly against cylinder wall. DO NOT FORCE.

4. Connect drive shaft to hone. Be sure that cylinder and hone are centered and aligned with the drive shaft and drill spindle. Lubricate hone as recommended by hone manufacturer.
5. The recommended drill speed is 300 to 700 rpm maximum and 40 - 60 strokes per minute.
6. Because cylinder bores normally wear (H) only in the area of ring travel (B), the cylinder bore will be round above and below ring travel (G).
7. Start drill. As hone spins, move it up and down at the bottom of the cylinder bore (D).
8. Gradually increase the length of the strokes until hone travels full length of cylinder bore (F). Do not travel more than **19.05 mm (0.750 in.)** to **25.4 mm (1.0 in.)** above cylinder bore (E).
9. Lubricate hone frequently to prevent build up on stones.
10. As cutting tension decreases, stop hone and tighten adjusting knob following hone manufacturer's recommendations.
11. Check cylinder bore size frequently.
12. Check cylinder bores at top and bottom for burrs. Remove burrs. Cylinder head and crankcase cover surfaces must be free of burrs and gasket material.
13. After cylinder bore has been brought to proper resizing dimension, a cross hatch must be applied to bore.

Item	Measurement	Specification
Specifications (31P677):		
Standard Bore Size		90.47 mm 3.562 in.)
Oversize Bore		90.98 mm 3.582 in.)

Item	Measurement	Specification
Specifications (331877):		
Standard Bore Size		94.02 mm 3.702 in.)
Oversize Bore		94.54 mm 3.722 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Flywheel Removal and Installation

Flywheel Removal and Installation

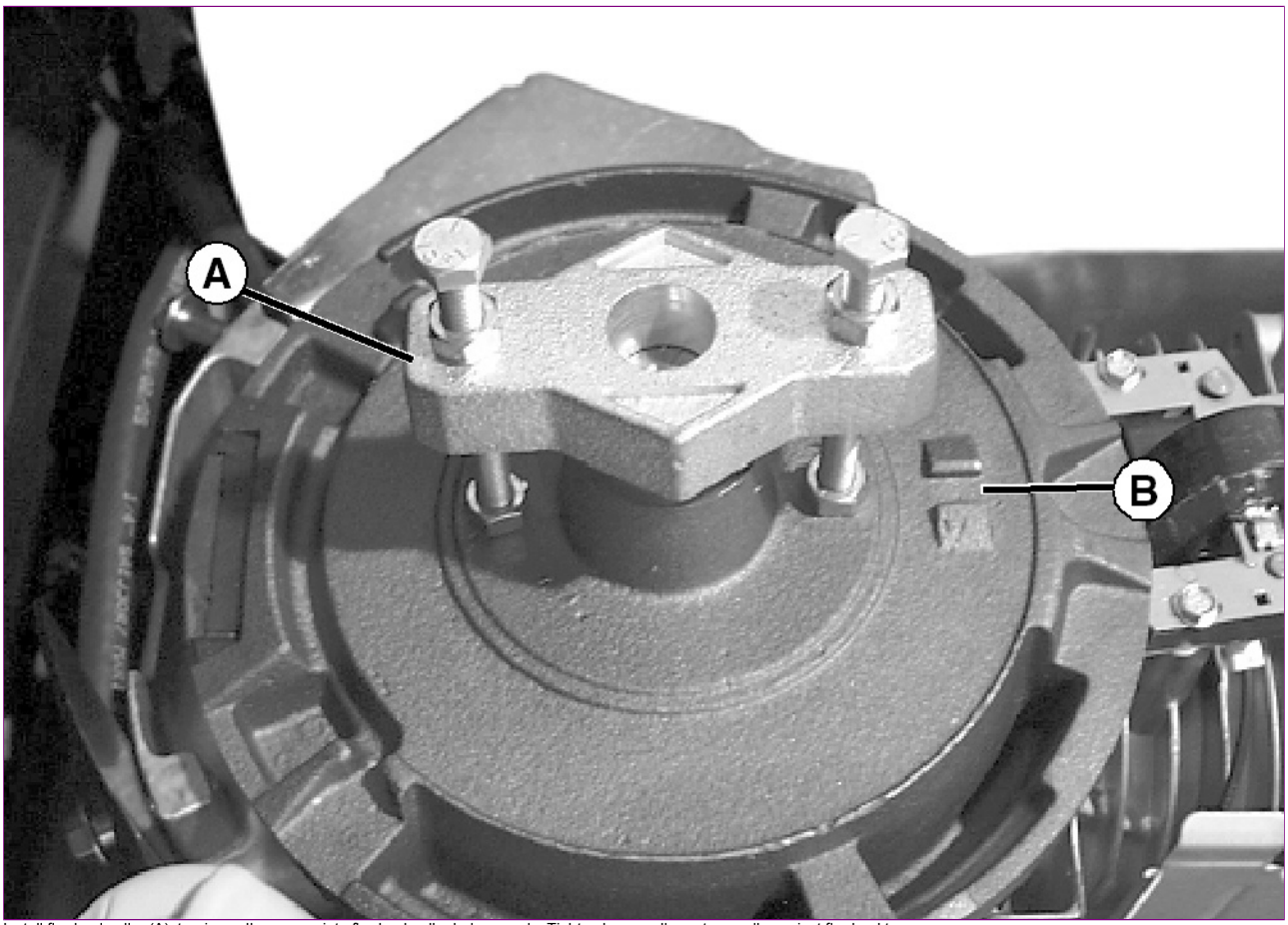
Procedure:

1. Remove blower housing and rotating screen.
2. Remove two screws securing fan. Remove fan
3. Loosen ignition coil screws and move ignition coil away from flywheel, or remove ignition coil completely.
4. *NOTE:*

   If the engine crankshaft rotates while loosening the flywheel bolt, secure the flywheel with a strap wrench.

   Use an impact wrench and 24 mm (15/16 in.) socket to loosen flywheel bolt. Do not remove at this time. Unscrew bolt about 6.5 (0.25 in.) for use with flywheel puller.
5. **IMPORTANT:**

   Do not use a flywheel puller that pulls against flywheel teeth.



   Install flywheel puller (A), turning puller screws into flywheel puller holes evenly. Tighten lower puller nuts equally against flywheel to secure screws.
6. Tighten upper puller nuts to press puller against flywheel bolt until flywheel separates from engine input shaft.
7. Remove puller, flywheel bolt, washer and flywheel.
8. Inspect flywheel for cracks, broken fins, burrs on the taper or keyway and distortion of the keyway. Check taper of crankshaft for burrs, rust or other damage. Replace crankshaft if damaged.
9. Inspect flywheel key for wear or damage. Replace if necessary.
10. ***CAUTION:***

    Improperly installed flywheel can cause machine damage and serious personal injury

    Before installing flywheel, clean taper and crankshaft taper removing all oil, dirt or grease.
11. Align keyway. Install key and flywheel.
12. Install flywheel bolt.
13. Place strap wrench on flywheel. While holding flywheel, tighten flywheel bolt to specification.
14. Align boss on back of fan with notch (B) in flywheel.
15. Install fan and secure with two screws.

Item	Measurement	Specification

Specifications:

Flywheel Bolt	136 N•m 100 lb-ft)
Fan Cap Screws	16 N•m 140 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Crankshaft and Cam Gear Removal

Crankshaft and Cam Gear Removal

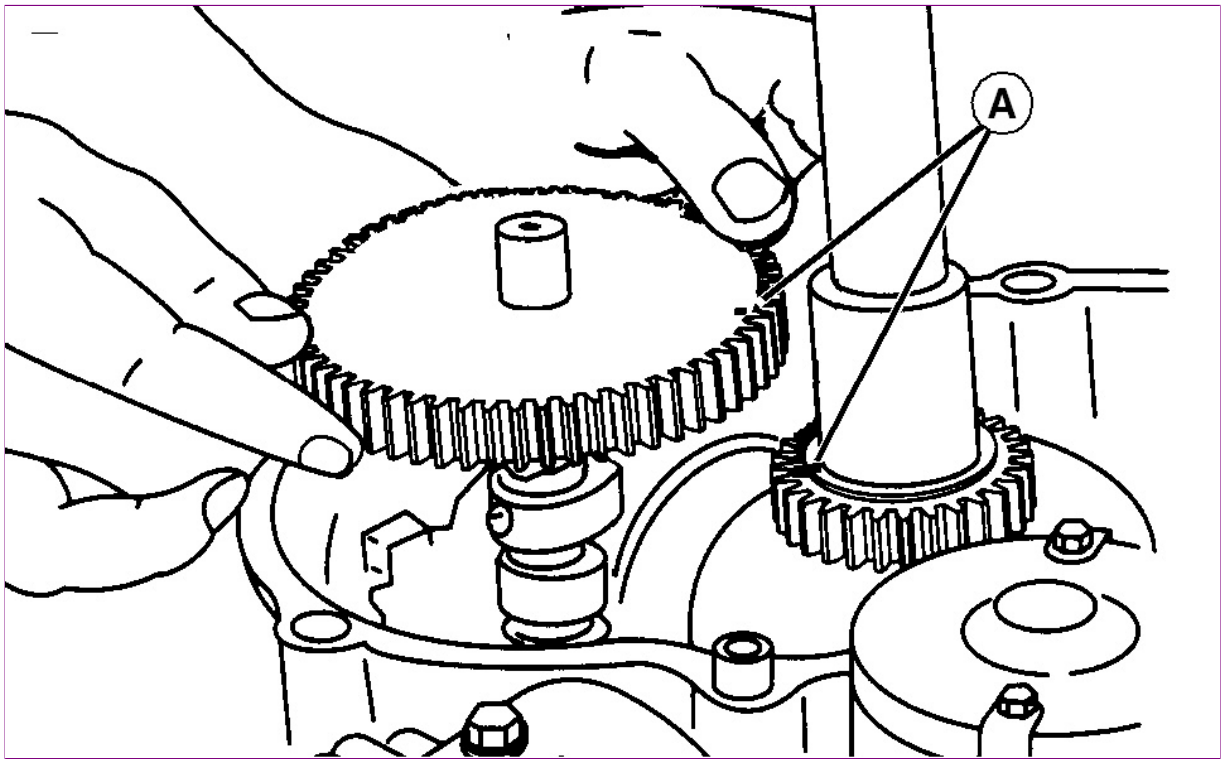
Procedure:

NOTE:

Remove rust, paint or burrs from power take off end of crankshaft before removing crankcase cover. This will reduce chances of damaging the crankcase cover bearing.

1. Drain oil from crank case.
2. Remove flywheel. See Flywheel Removal and Installation .
3. Remove crankcase cover. If crankcase cover sticks, tap lightly with soft hammer on alternate sides near dowel pins.
4. **IMPORTANT:**

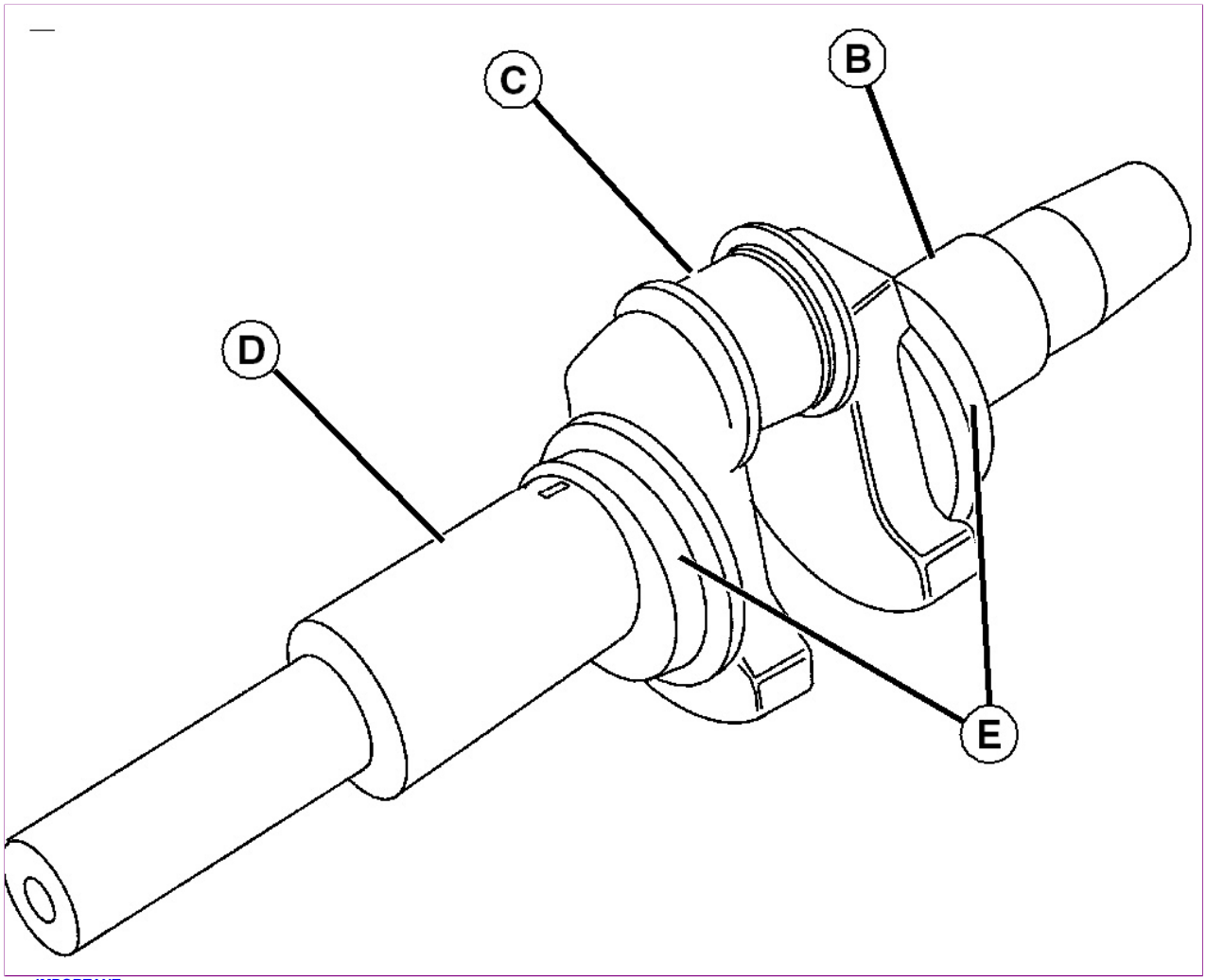
   Do not remove dowel pins.

   Tip engine over onto flywheel side of crankcase.
5. Support engine to prevent end of crankshaft from resting on workbench.
6. 

   Rotate crankshaft until timing marks (A) are aligned. With cam gear in this position, the valve tappets will remain clear of cam lobes.
7. Lift out camshaft.
8. Remove piston and connecting rod assemblies.
9. **IMPORTANT:**

   If engine is rotated from this position, tappets will fall out. Tappets must not be mixed.

   Remove crankshaft from crankcase.

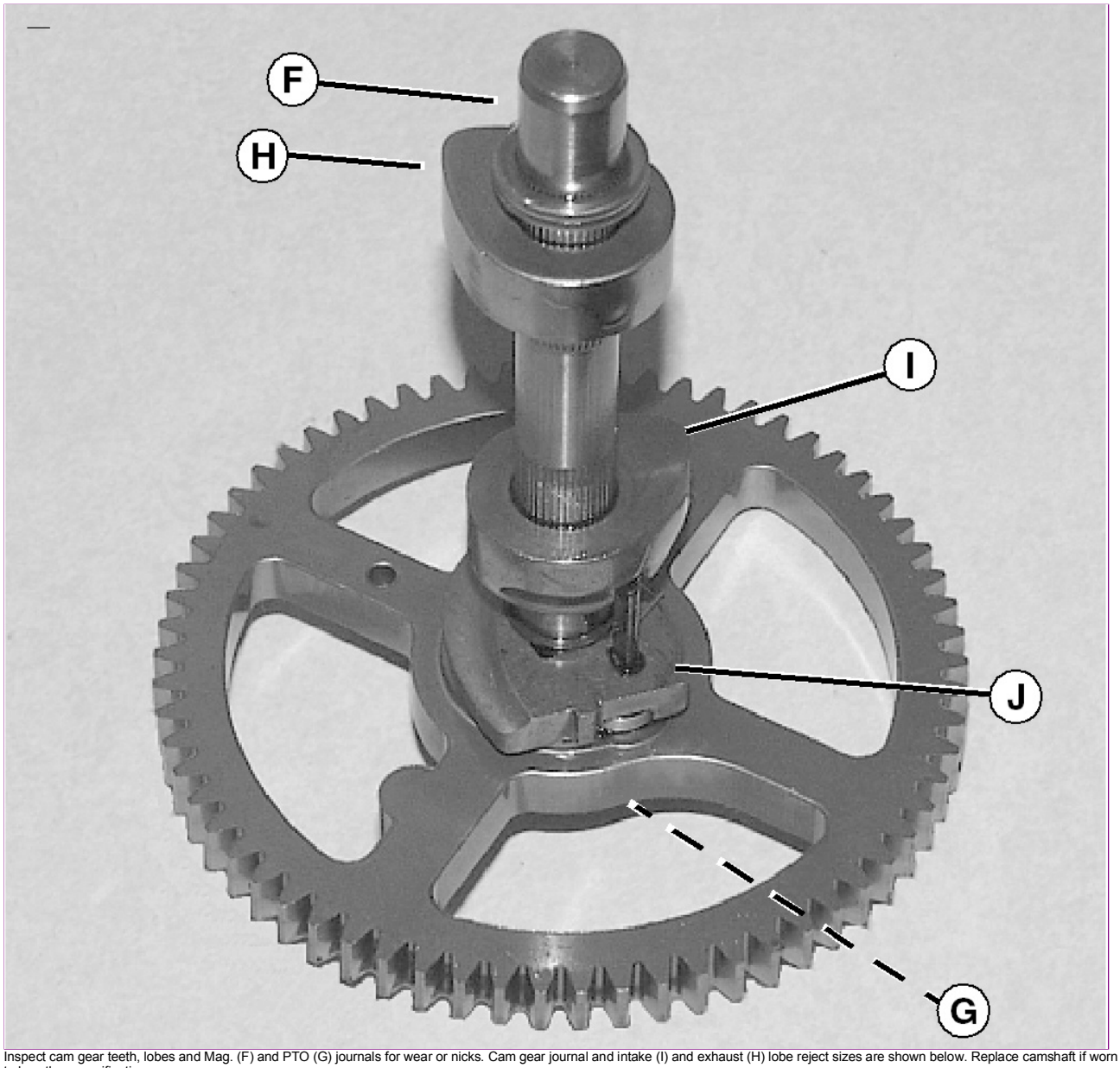


10. **IMPORTANT:**

    Measure various wear points on the crankshaft, including the Mag. Journal (B), Crankpin (C), PTO Journal (D), and Eccentric Journals (E).

    Check timing gear for chipped or cracked teeth and keyway for wear. Replace timing gear, if damaged. If timing gear is chipped or cracked, also check cam gear for damage.
11. Replace crankshaft if worn or if journals are scored. Keyways should be checked to be sure they are not worn or spread. Remove burrs from keyway edges to prevent damaging the bearing or oil seal.
12. *NOTE:*

    Always replace tappets if the camshaft is replaced. Pre-lubricate tappets and cam lobes with multipurpose grease.



Inspect cam gear teeth, lobes and Mag. (F) and PTO (G) journals for wear or nicks. Cam gear journal and intake (I) and exhaust (H) lobe reject sizes are shown below. Replace camshaft if worn to less than specifications.

13. Check compression release (J) mechanism for wear, nicks, and freedom of movement.

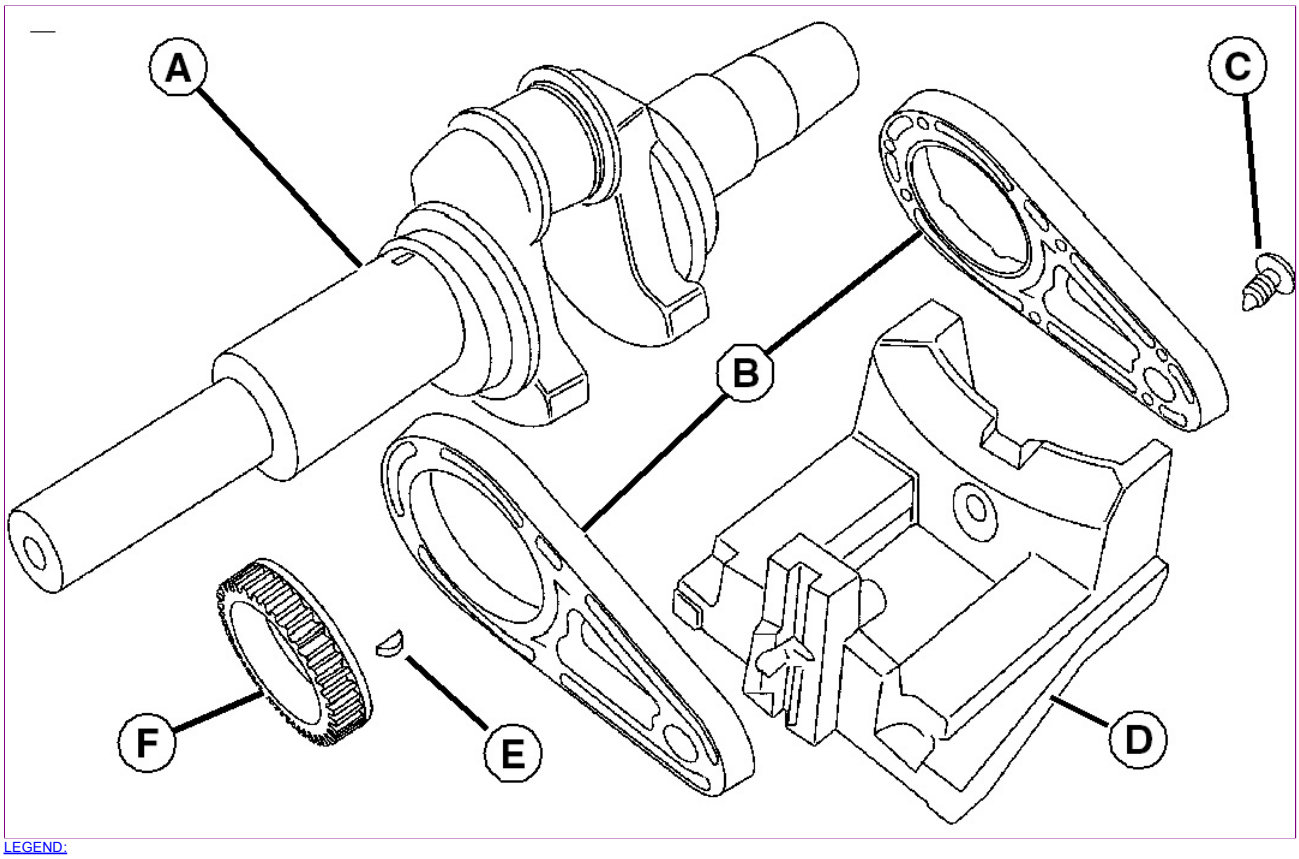
Item	Measurement	Specification
Specifications:		
Crankshaft PTO Journal		41.20 mm 1.622 in.)
Crankshaft Mag. Journal		34.95 mm 1.376 in.)
Crankshaft Crankpin		38.02 mm 1.497 in.)
Crankshaft Eccentric Journal (Wear Limit)		55.93 mm 2.202 in.)
Camshaft PTO Journal (Wear Limit)		12.65 mm 0.498 in.)
Camshaft Mag. Journal (Wear Limit)		12.65 mm 0.498 in.)
Cam Lobe (Wear Limit)		30.07 mm 1.184 in.)
Camshaft Bearing (Wear Limit)		12.8 mm 0.504 in.)
Compression Release Lobe		0.25 mm 0.010 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Balance System Removal and Installation

Balance System Removal and Installation

Removal:

1. Remove crankshaft.

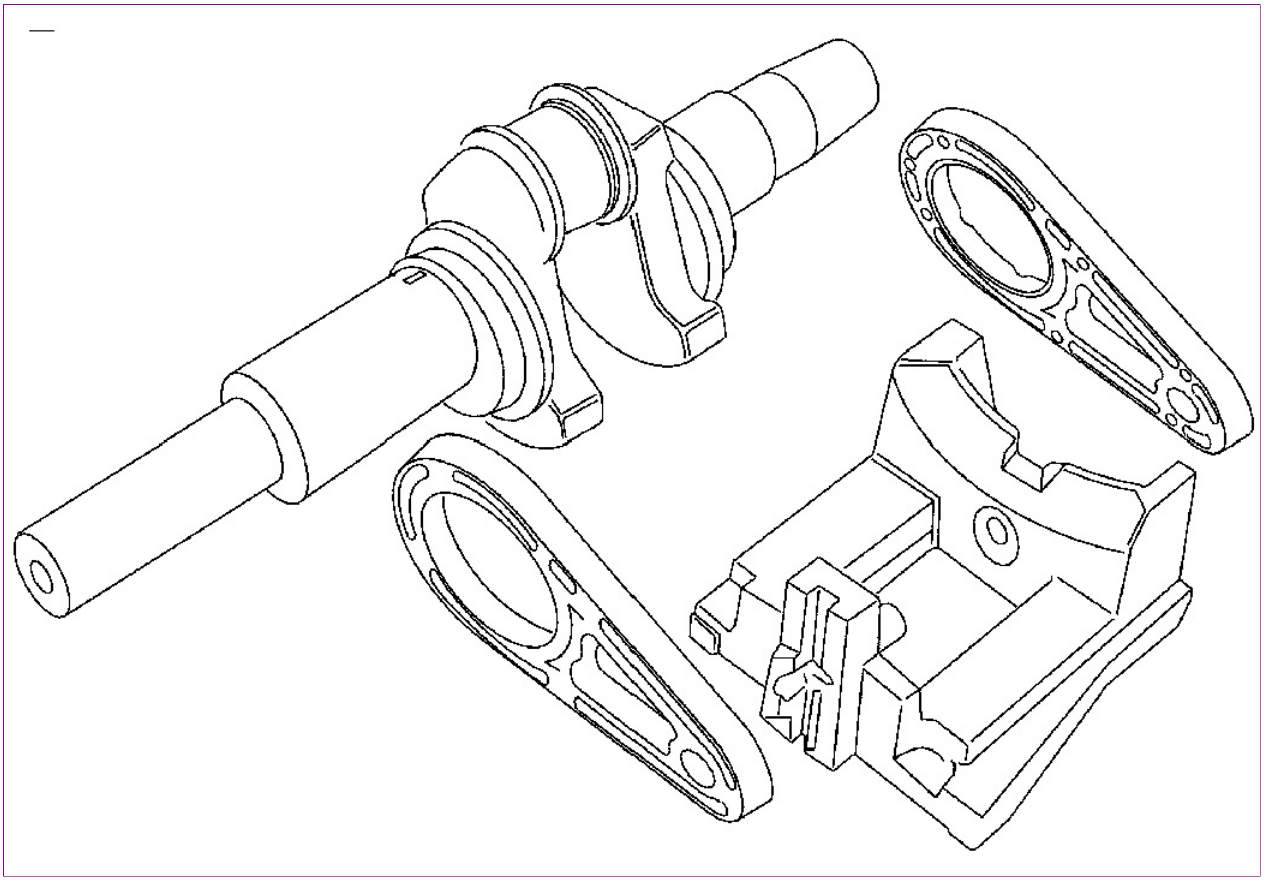


LEGEND:

A - Crankshaft
B - Counterweight Links
C - Alignment Plug
D - Counterweight
E - Woodruff Key
F - Crankshaft Gear

2. Remove the crankshaft gear (F) from the crankshaft (A). If the gear is tight pry it off using two screwdrivers, being careful not to damage the gear.
3. Remove the woodruff key (E) from the crankshaft.
4. Remove and discard the plastic alignment plug (C) from the Mag side of the counterweight (D). Slide the counterweight from the counterweight links (B).
5. Remove the counterweight links from the crankshaft.

Inspection:

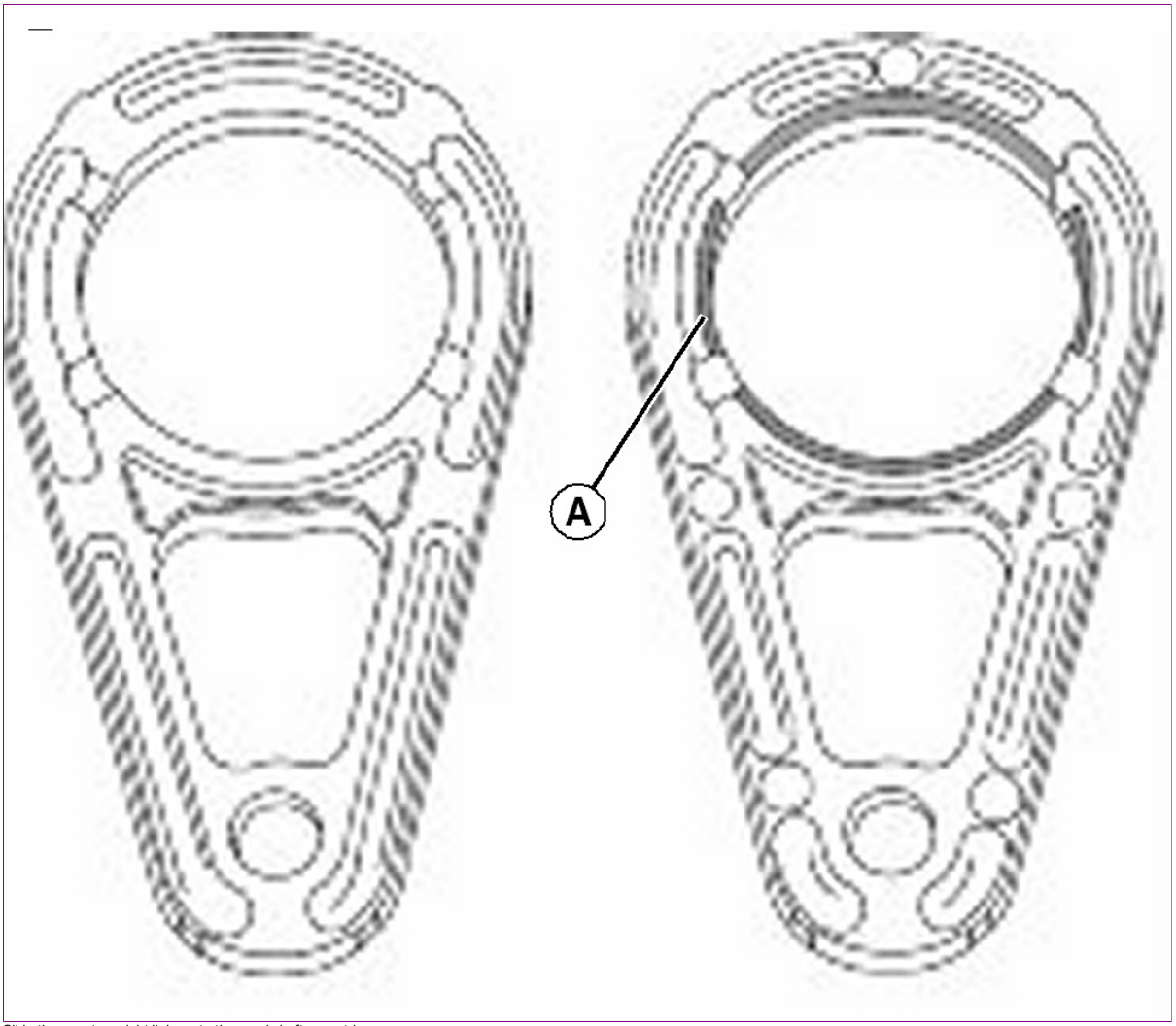


1. Check counterweight pins, counterweight link bearing surfaces, and crankshaft eccentric surfaces for wear.
2. If counterweight link bearing surfaces are discolored, scored or worn to or over reject size, the links must be replaced.

Installation:

1. Lubricate bearing surfaces with new engine oil.
2. *NOTE:*

   Both counterweight links must be installed with the chamfer (A), facing the crankshaft throw. The sides of the link without a chamfer face the outside of the engine.



Slide the counterweight links onto the crankshaft eccentrics.

3. Slide the counterweight into the counterweight links.
4. *NOTE:*

   The plastic alignment plug aids in the assembly of the counter-weight assembly. Replace this plug whenever it is removed from the counterweight.

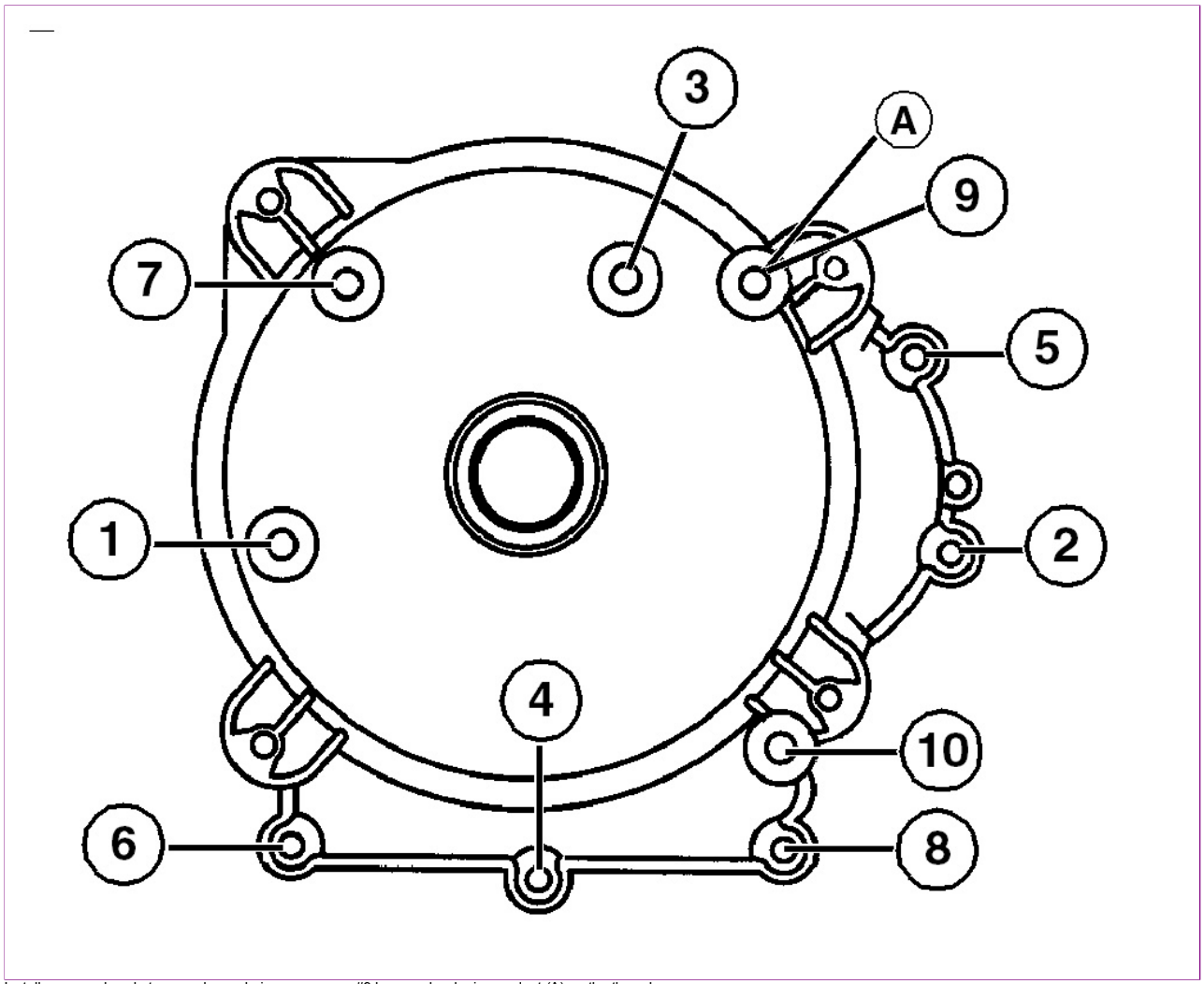
   Press a new plastic alignment plug into the Mag. side of the counterweight.
5. Install the woodruff key to the crankshaft.
6. Install the crankshaft gear to the crankshaft. The flange of the gear must face the counterweight link.

Item	Measurement	Specification
Specifications:		
Crankshaft Eccentric Journal (Wear Limit)		55.93 mm 2.202 in.)
Counterweight Link Bearing (Wear Limit)		56.13 mm 2.210 in.)

Crankshaft/Cam Gear Installation

Procedure:

1. Install intake and exhaust valve tappets.
2. Place seal protector in magneto crankshaft seal.
3. Place crankshaft and balancer assembly into block and start magneto journal into magneto bearing.
4. Install connecting rod on crankshaft.
5. Install cam gear, making sure tappets clear cam lobes.
6. Timing marks must be aligned.
7. Install governor and oil slinger assembly. See Governor Removal and Installation .



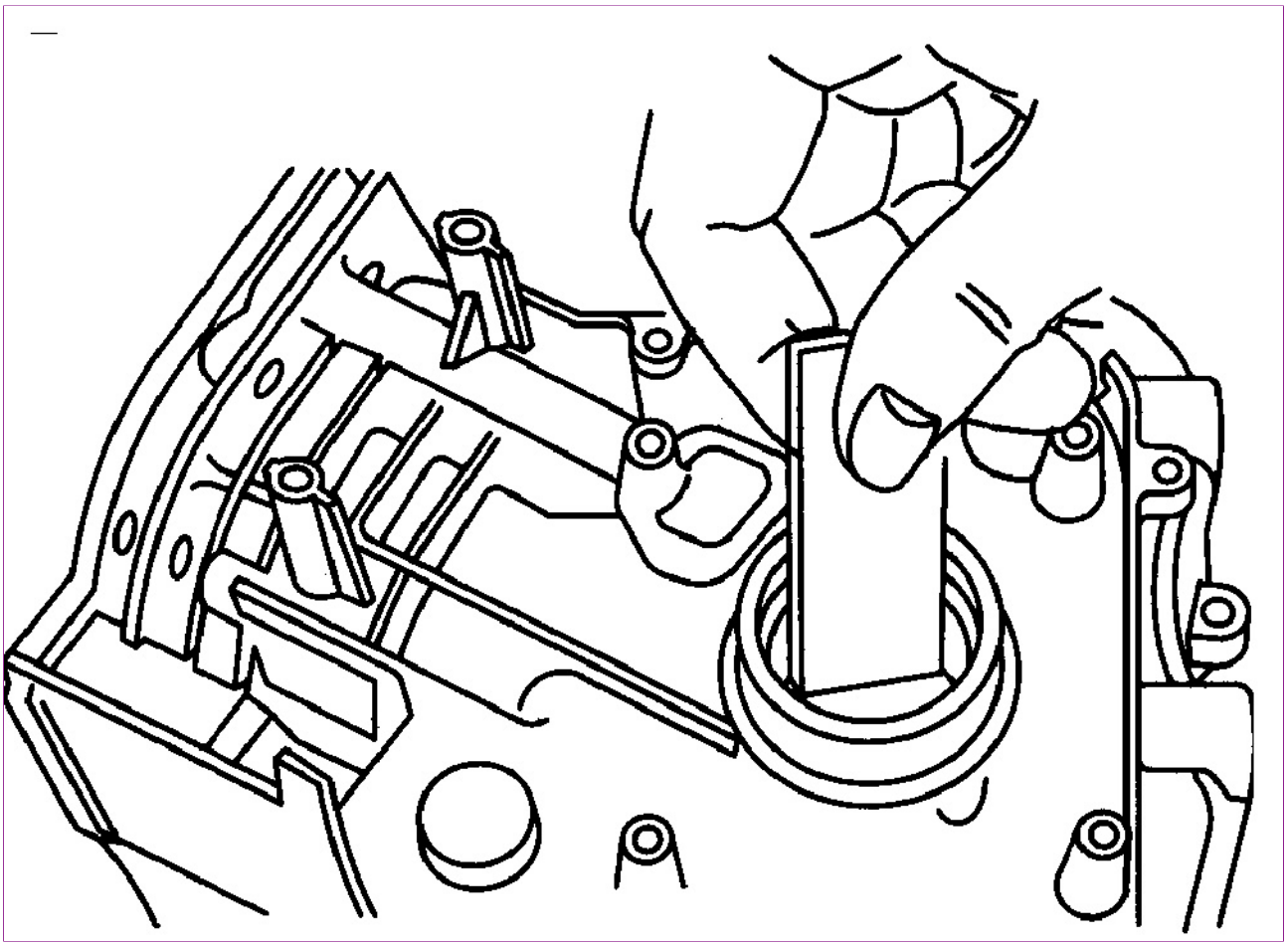
8. Install cover and gasket on crankcase being sure screw #9 has non hardening sealant (A) on the threads.
9. Protect the oil seal while assembling crankcase cover. Do not use force to assemble.
10. Tighten cover bolts to **20 N•m (180 lb-in.)** using the sequence shown.
11. Install cylinder head. See Cylinder Head Removal and Installation .
12. Install flywheel. See Flywheel Removal and Installation .
13. Install intake manifold and carburetor assembly. See Carburetor Removal and Installation .
14. Install governor lever and governor springs. See Governor Removal and Installation .
15. Install oil fill tube and dipstick assembly.
16. Perform static governor adjustment. See Governor Adjustment - Static .
17. Install engine shrouding. See Upper Blower Housing Removal and Installation .
18. Install air filter assembly. See Air Cleaner Service .

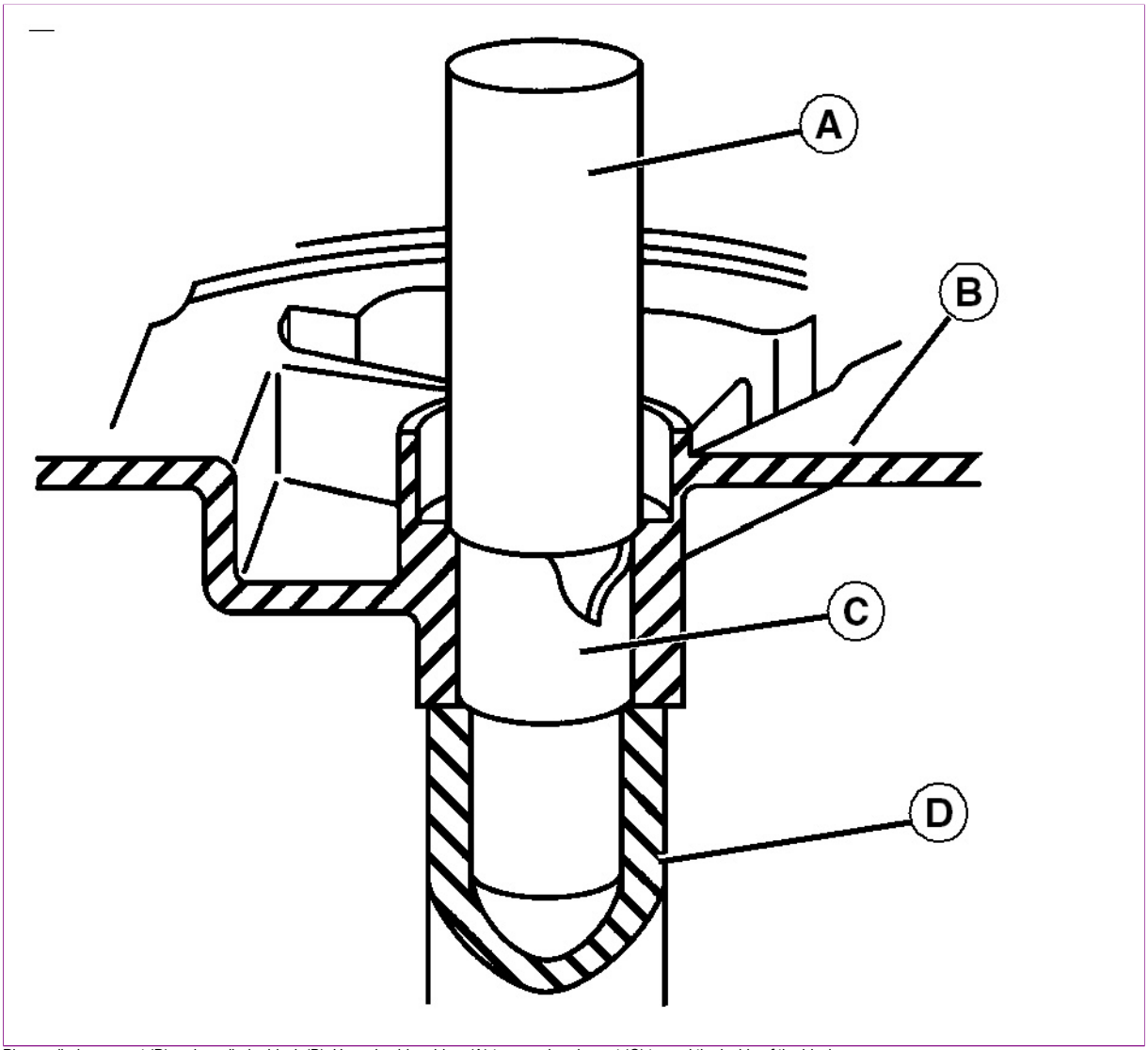
Item	Measurement	Specification
Specification:		
Sump Cover		20 N•m 180 lb-in.)

Magneto Bearing Inspection

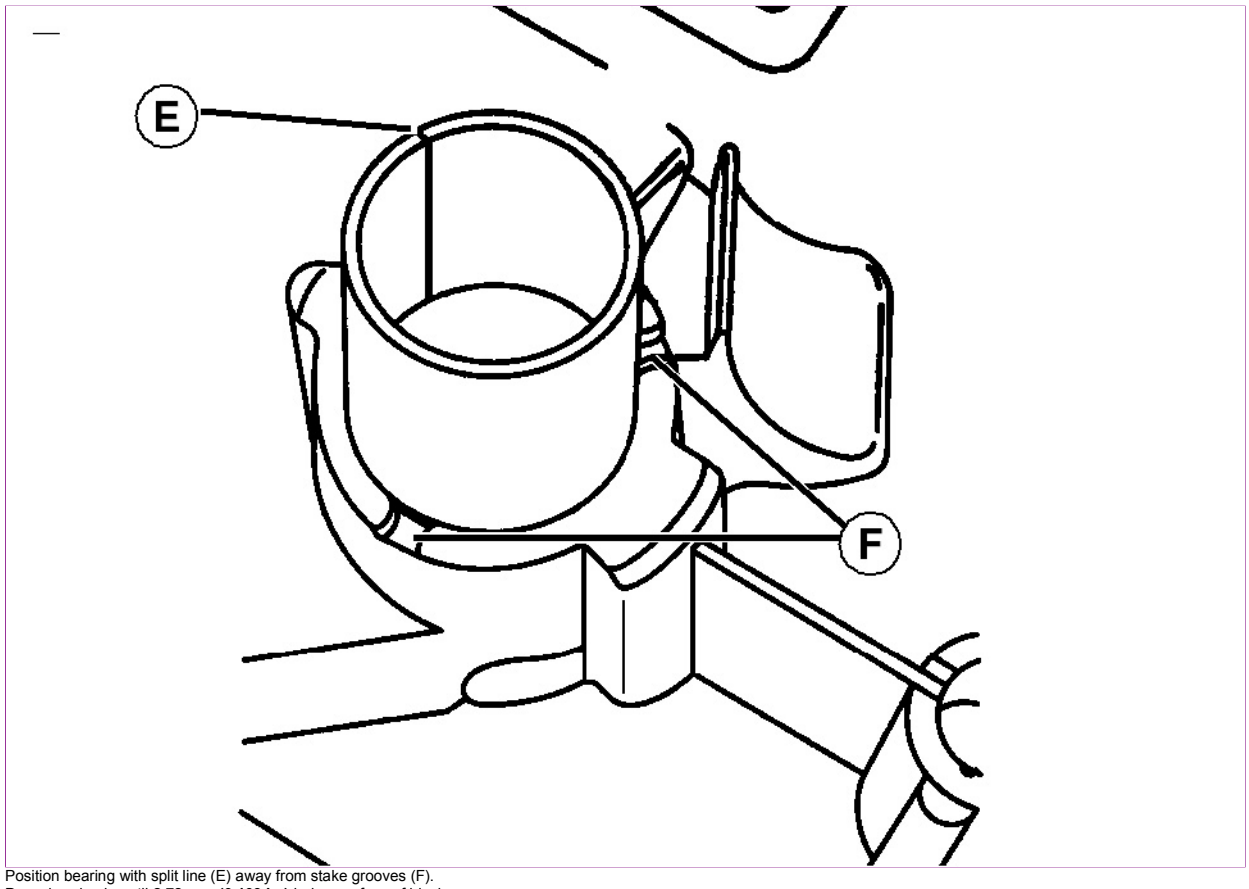
Procedure:

1. Replace the main magneto bearing if scored or not within specification.

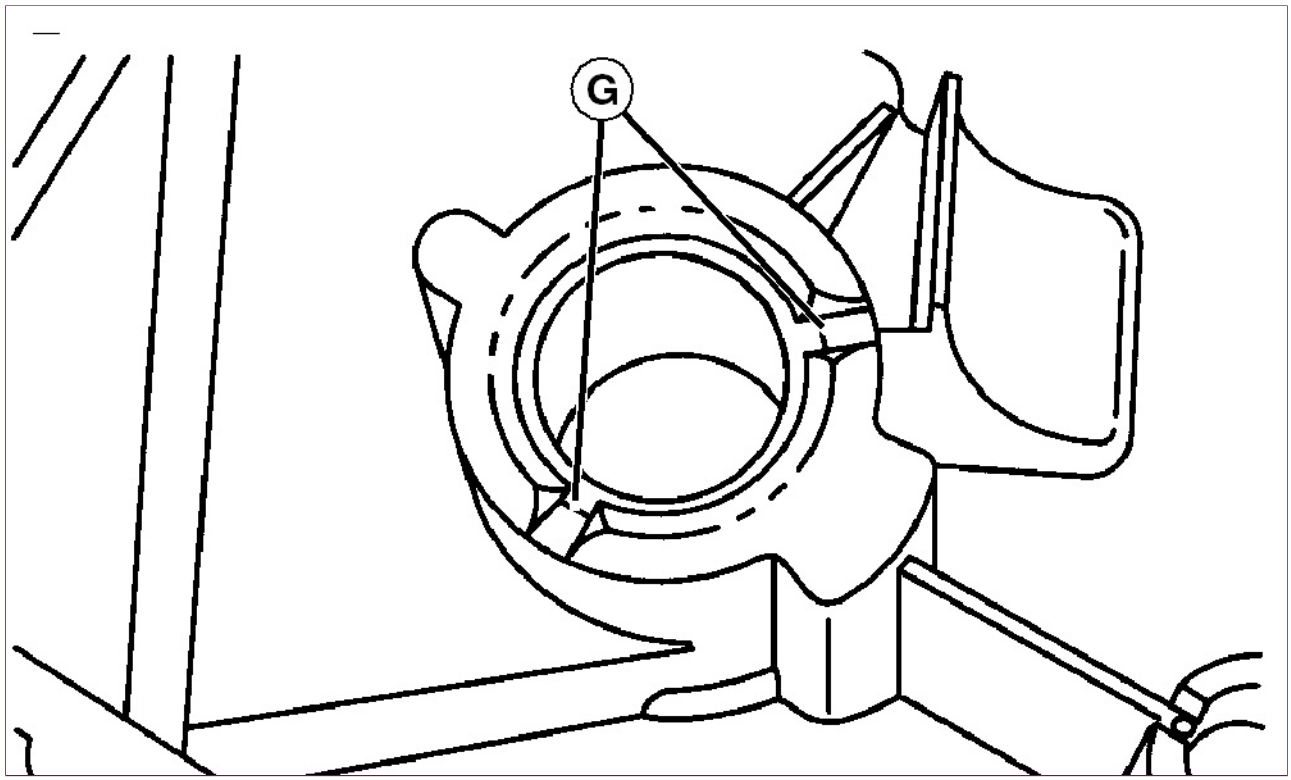




2. Place cylinder support (D) under cylinder block (B). Use a bushing driver (A) to press bearing out (C) toward the inside of the block.
3. Lubricate outside surface of bearing and place on inside of block.



4. Position bearing with split line (E) away from stake grooves (F).
5. Press bearing in until **2.78 mm (0.109 in.)** below surface of block.



6. Stake new bearing into position at locations shown (G).
7. When installing new magneto side oil seal, properly support cylinder. Press in seal until it is **1.5 mm (0.059 in.)** below mounting surface.
8. Replace the cylinder block if the cam gear bearing dimensions exceed reject size.

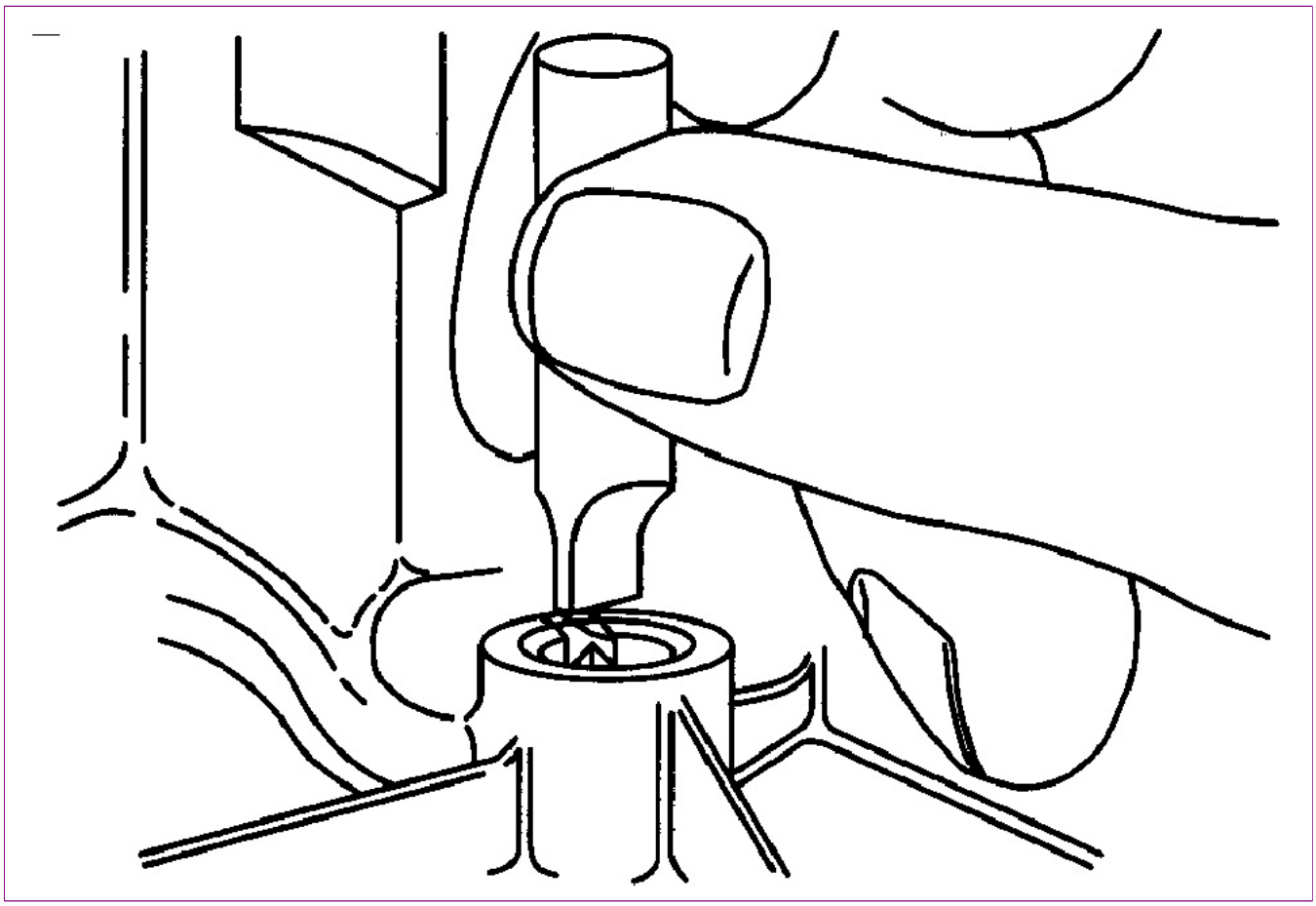
Item	Measurement	Specification

Specifications:

Magneto Bearing Reject Size	35.13 mm 1.383 in.)
Magneto Bearing Depth	2.78 mm 0.109 in.)
Magneto Oil Seal Depth	1.5 mm 0.059 in.)

Cam Gear Bearing Inspection

Procedure:



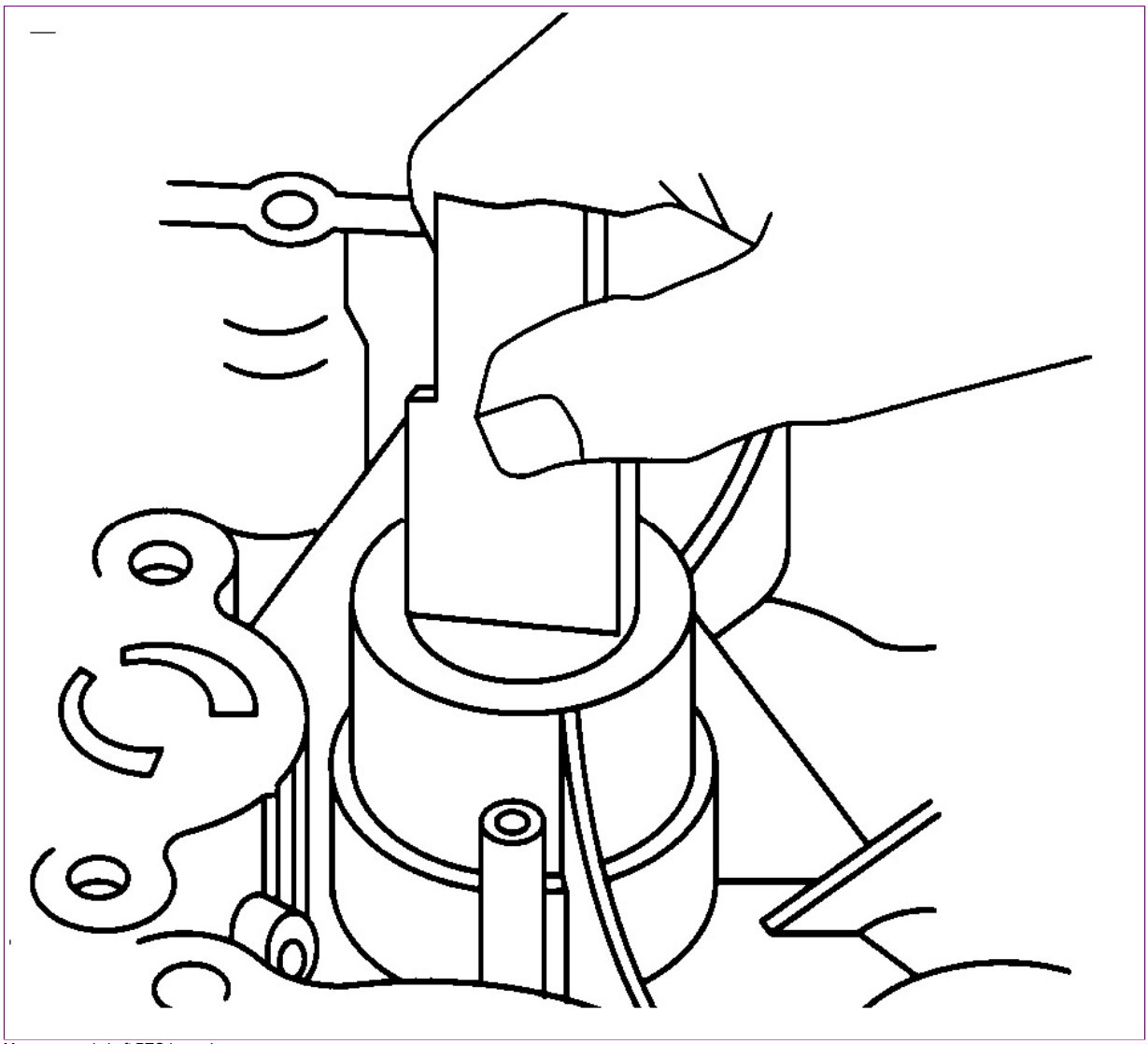
1. Measure cam gear bearing.
2. If bearing is worn beyond specification the, cylinder, crankcase cover, or sump must be replaced.

Item	Measurement	Specification
Specification:		
Cam Gear Bearing Reject		12.80 mm 0.504 in.)

PTO Journal Inspection and Seal Replacement

Procedure:

1. From the inside, press the oil seal out of the PTO journal.



2. Measure crankshaft PTO journal.
3. Replace the crankcase cover or sump if the journal is worn beyond specification.
4. Support crankcase cover and install new oil seal. Press in seal until it is flush with mounting surface.

Item	Measurement	Specification
Specifications:		
PTO Journal Wear Limit		41.37 mm 1.629 in.)
Seal Depth		Flush

NOTE:

Install new oil seals whenever engine is disassembled. Always use the correct seal protector to prevent damaging oil seal.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Motor Removal and Installation

Starting Motor Removal and Installation

Procedure:

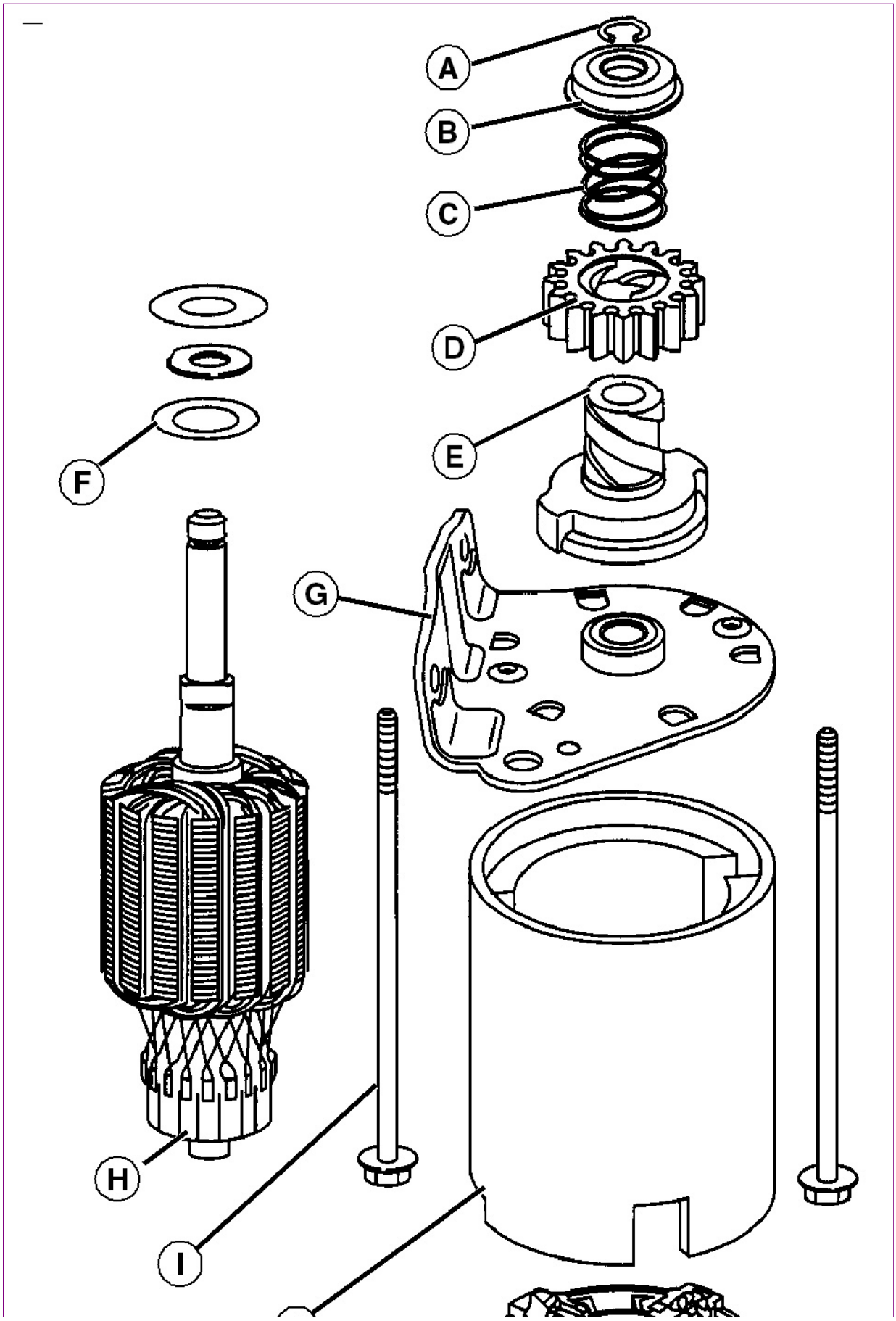
1. Disconnect negative (-) battery cable.
2. Disconnect wires from the starting motor cable lug.
3. Remove starting motor bolts.
4. Install starting motor bolts. Tighten to specification.
5. Install starting motor pinion gear cover plate, flywheel and upper blower housing (if removed).

Item	Measurement	Specification
Specification:		
Starter Bolts		16 N•m 140 lb-in.)

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Starting Motor Disassembly

Procedure:


A
B
C
D
E
F
G
H
I

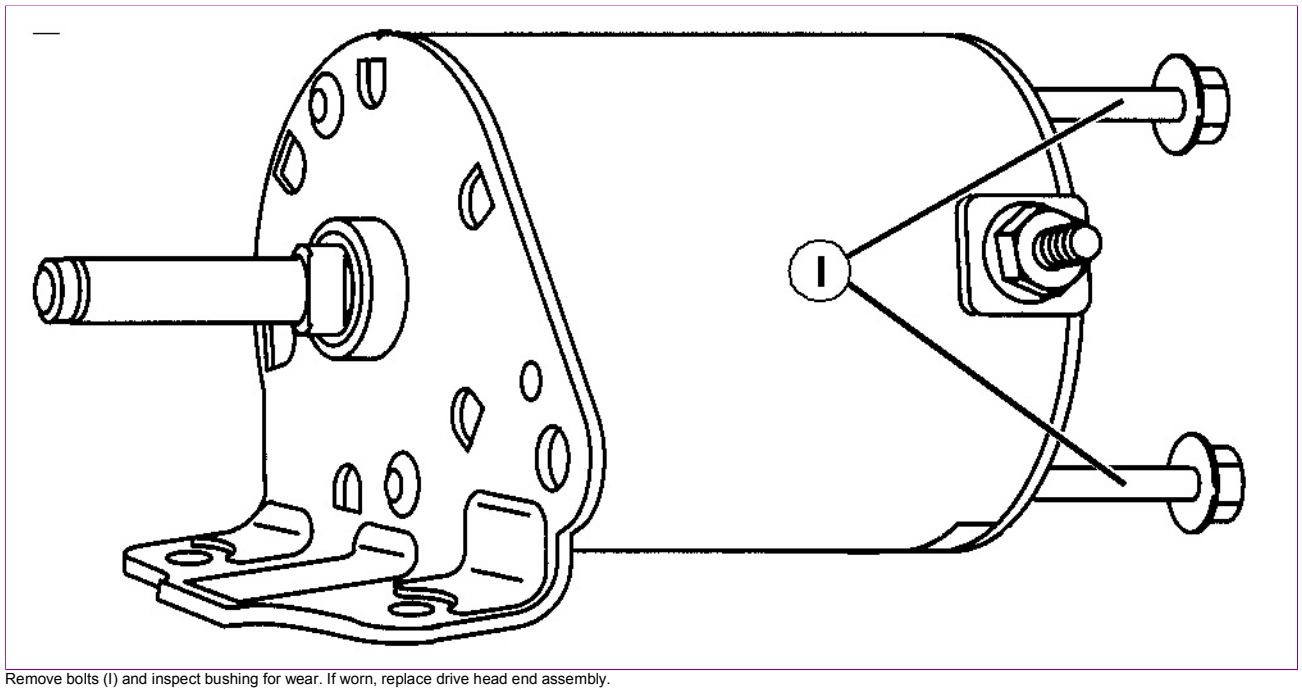
LEGEND:

A - C-Ring
B - Retainer
C - Spring
D - Drive gear
E - Helix (Starter Clutch)
F - Wave Washer
G - Drive End Head
H - Armature
I - Thru Bolt
J - Housing
K - Brusher Holder
L - End Cap

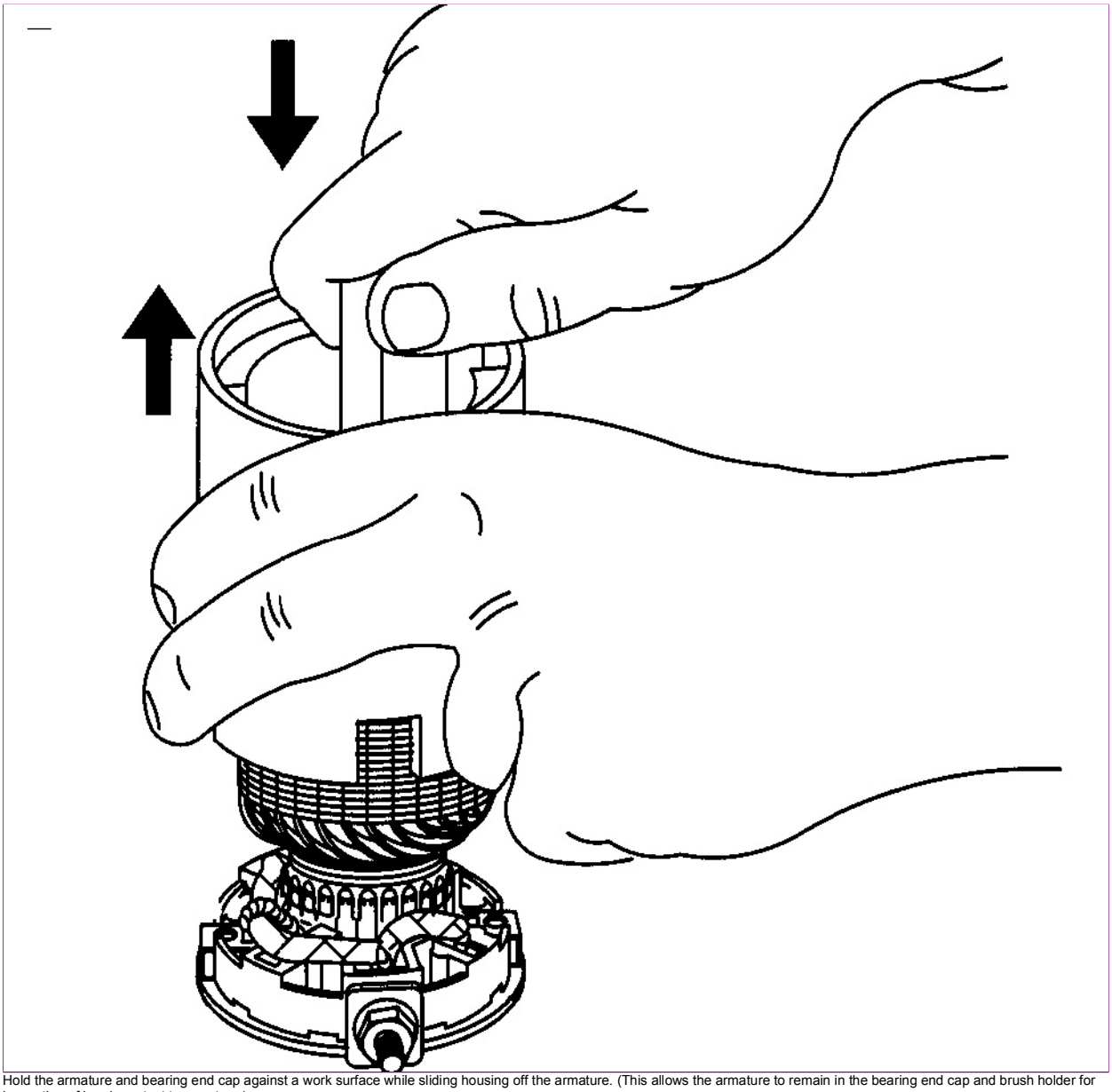
IMPORTANT:

DO NOT clamp motor housing in a vise or strike with a steel hammer. Starter motors contain two powerful magnets that can be broken or cracked if the motor housing is deformed or damaged.

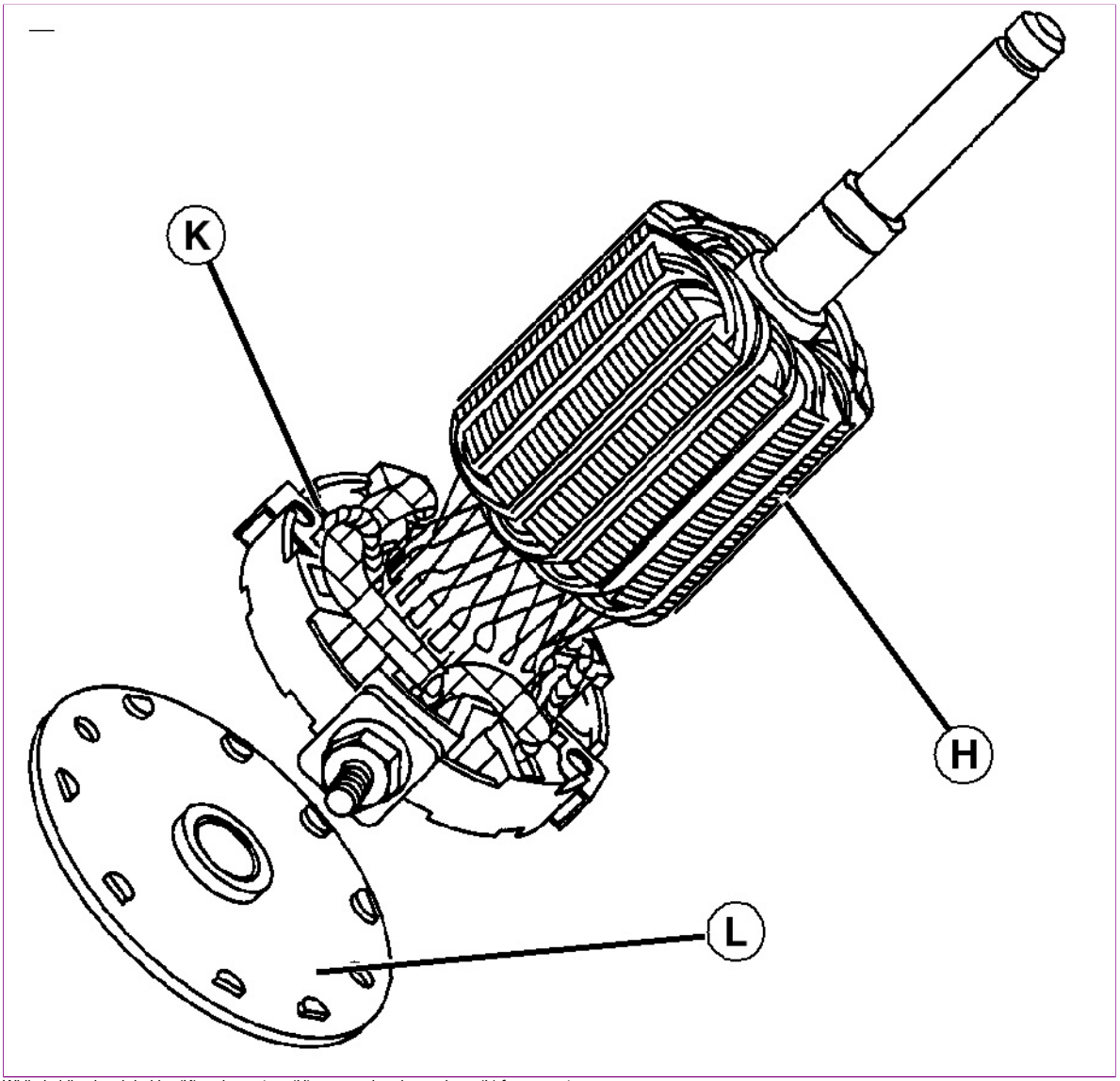
1. Refer to Pinion Gear Replacement to remove pinion gear assembly. See Starting Motor Pinion Gear Replacement .



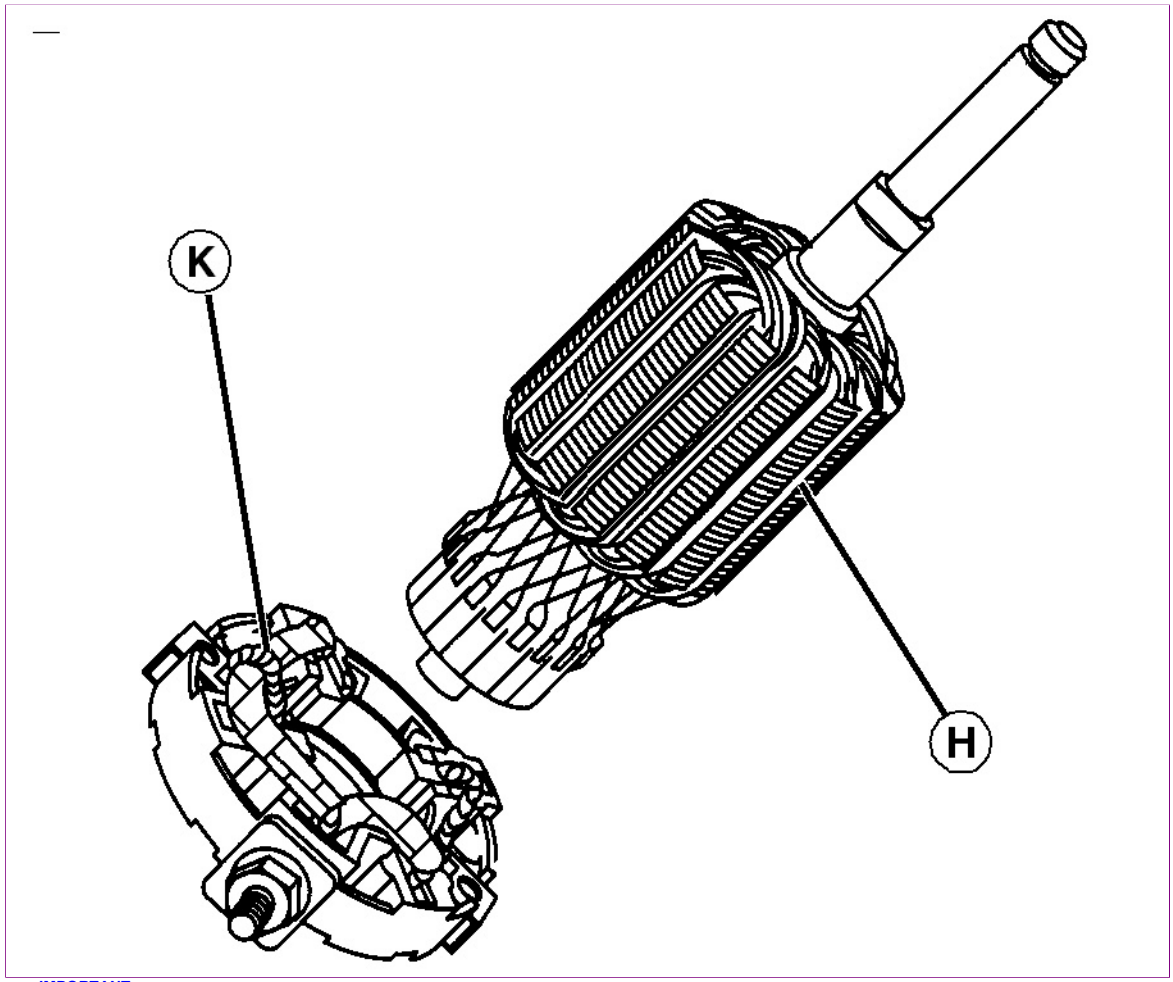
2. Remove bolts (I) and inspect bushing for wear. If worn, replace drive head end assembly.



3. Hold the armature and bearing end cap against a work surface while sliding housing off the armature. (This allows the armature to remain in the bearing end cap and brush holder for inspection of brush contact to armature.)

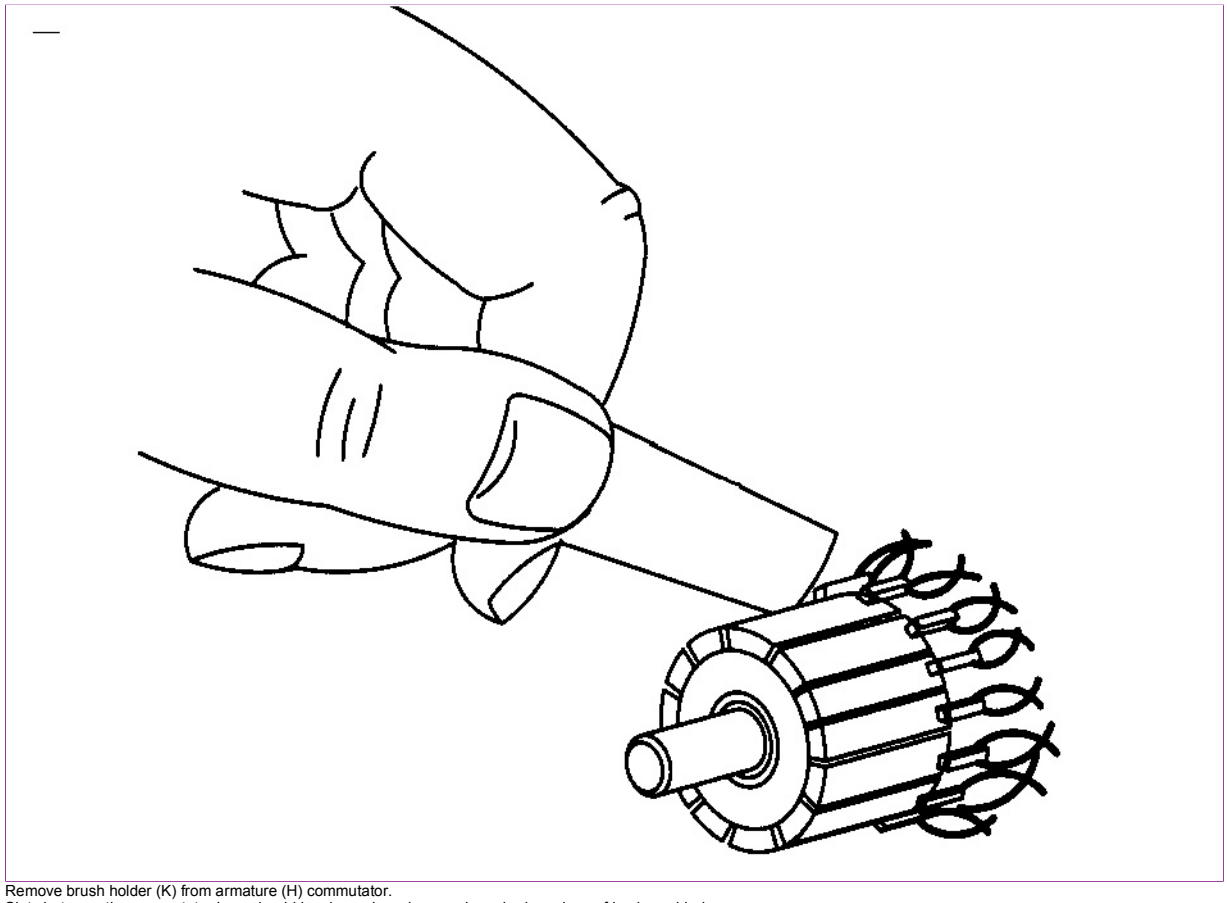


4. While holding brush holder (K) and armature (H), remove bearing end cap (L) from armature.



5. **IMPORTANT:**

   DO NOT use emery cloth to clean the commutator. The particles from the cloth will become embedded in the commutator and cause rapid brush wear.

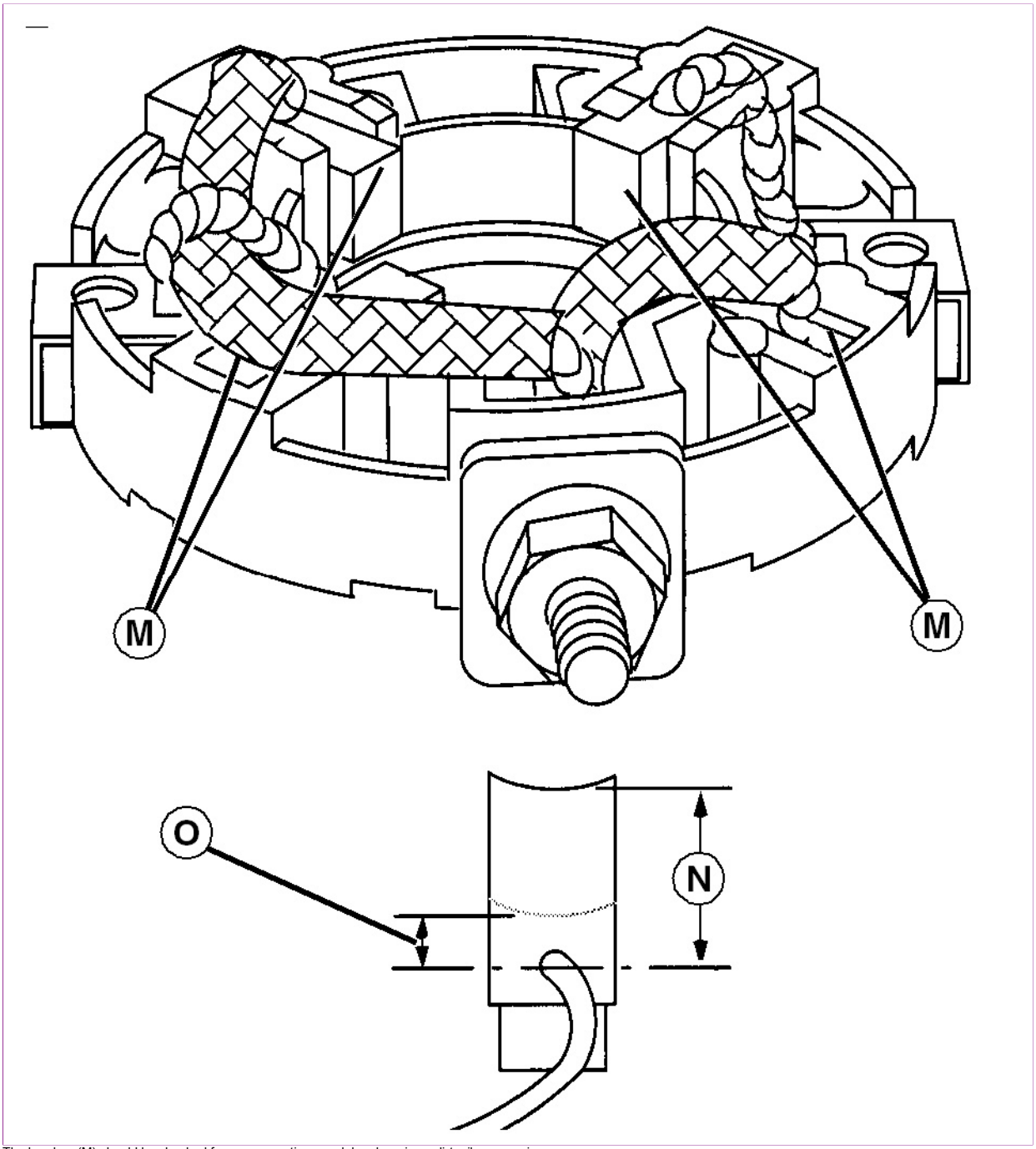


Remove brush holder (K) from armature (H) commutator.

6. Slots between the commutator bars should be cleaned as shown using a broken piece of hacksaw blade.
7. *NOTE:*

   The bearing housing and armature should not be soaked in cleaning solution. Fine sandpaper, such as crocus cloth, can be used to clean the armature. The commutator may also be machined with a diamond cutting tool to no less than 31.24 mm (1.23 in.) OD.

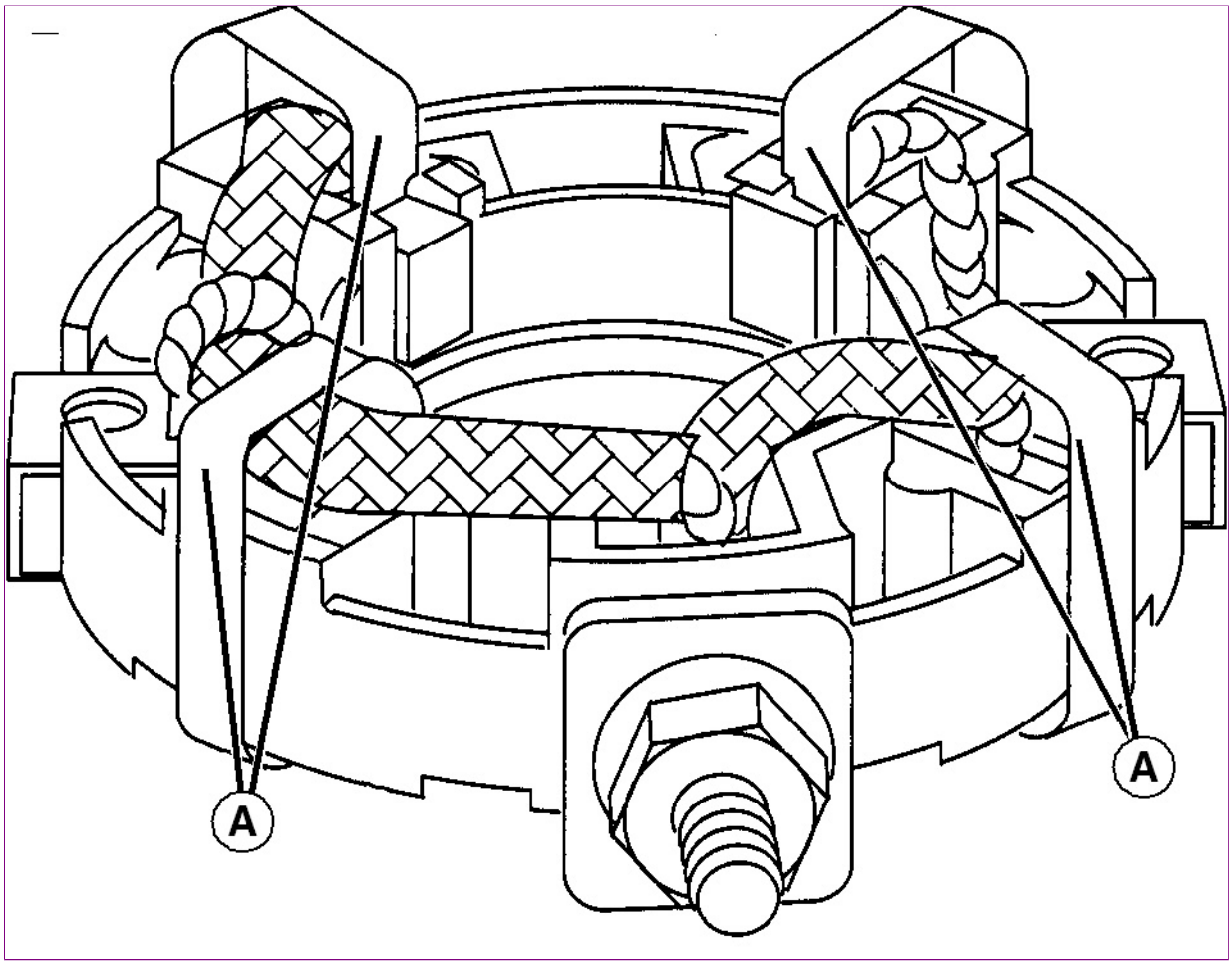
If it is suspected that the armature field coil, magnets or motor housing is defective, a new part should be tried in the motor. If testing equipment is available, check the suspected armature or field coil to determine if it is defective (opens or grounds).



8. The brushes (M) should be checked for proper seating, weak brush springs, dirt, oil or corrosion.
9. Note normal length new (N). If brushes are worn to **3.0 mm (0.118 in.)** (O), replace brushes.
10. When all parts have been thoroughly cleaned, lightly lubricate the bearings with #20 oil.

Starting Motor Assembly

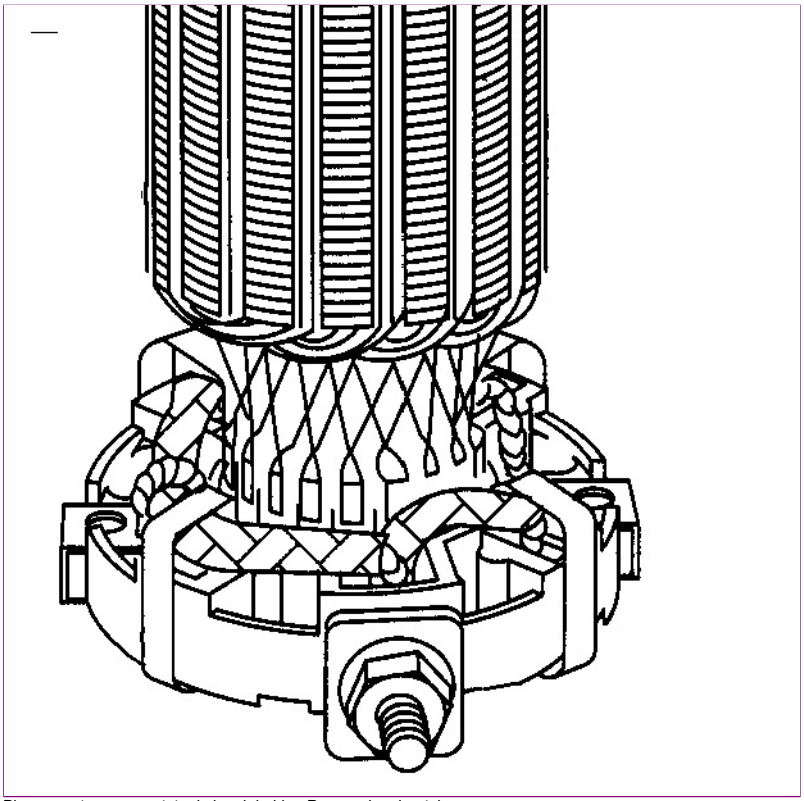
Procedure:



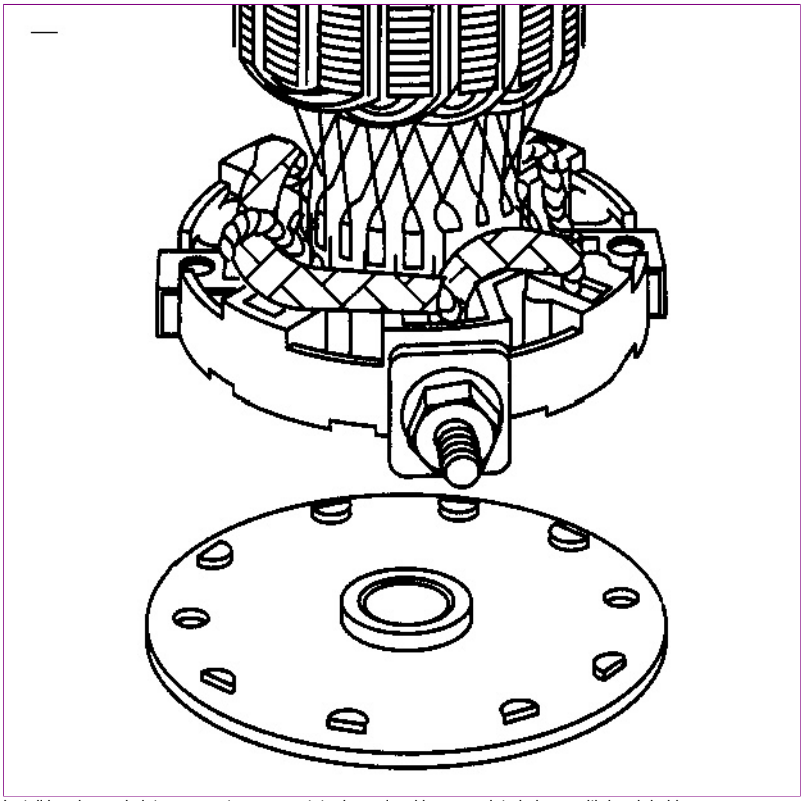
NOTE:

Brush retainers (A) can be made from standard paperclips. Straighten and cut to 64 mm (2-1/2 in.). Bend into a U-shape with 25 mm (1 in.) sides, and 14 mm (1/2 in.) bottom.

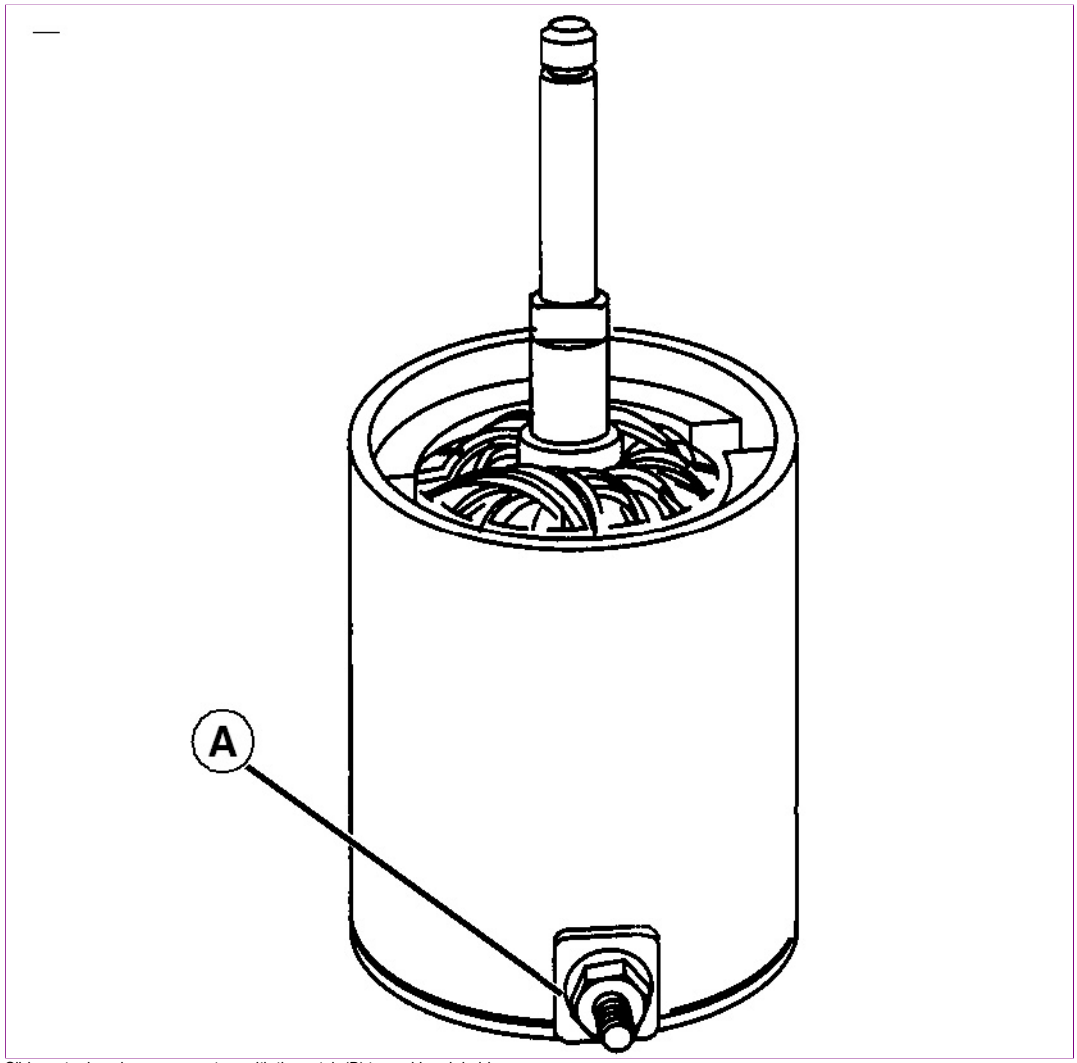
1. Place brushes in their slots. Hold brushes with retainers (A).



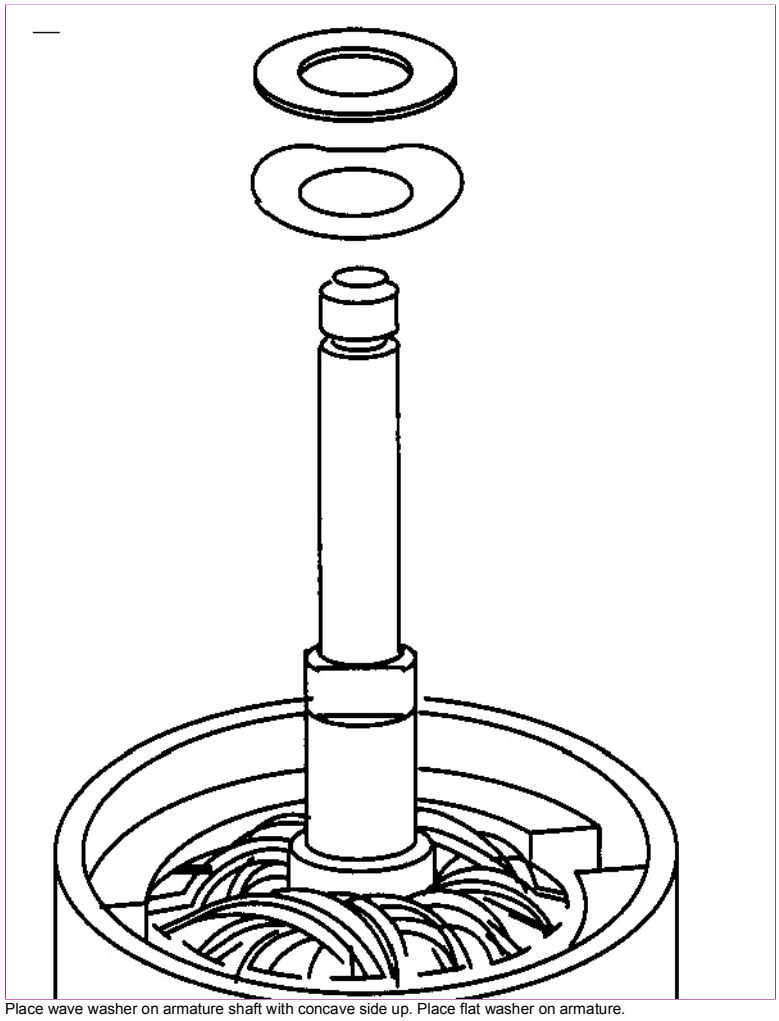
2. Place armature commutator in brush holder. Remove brush retainers.



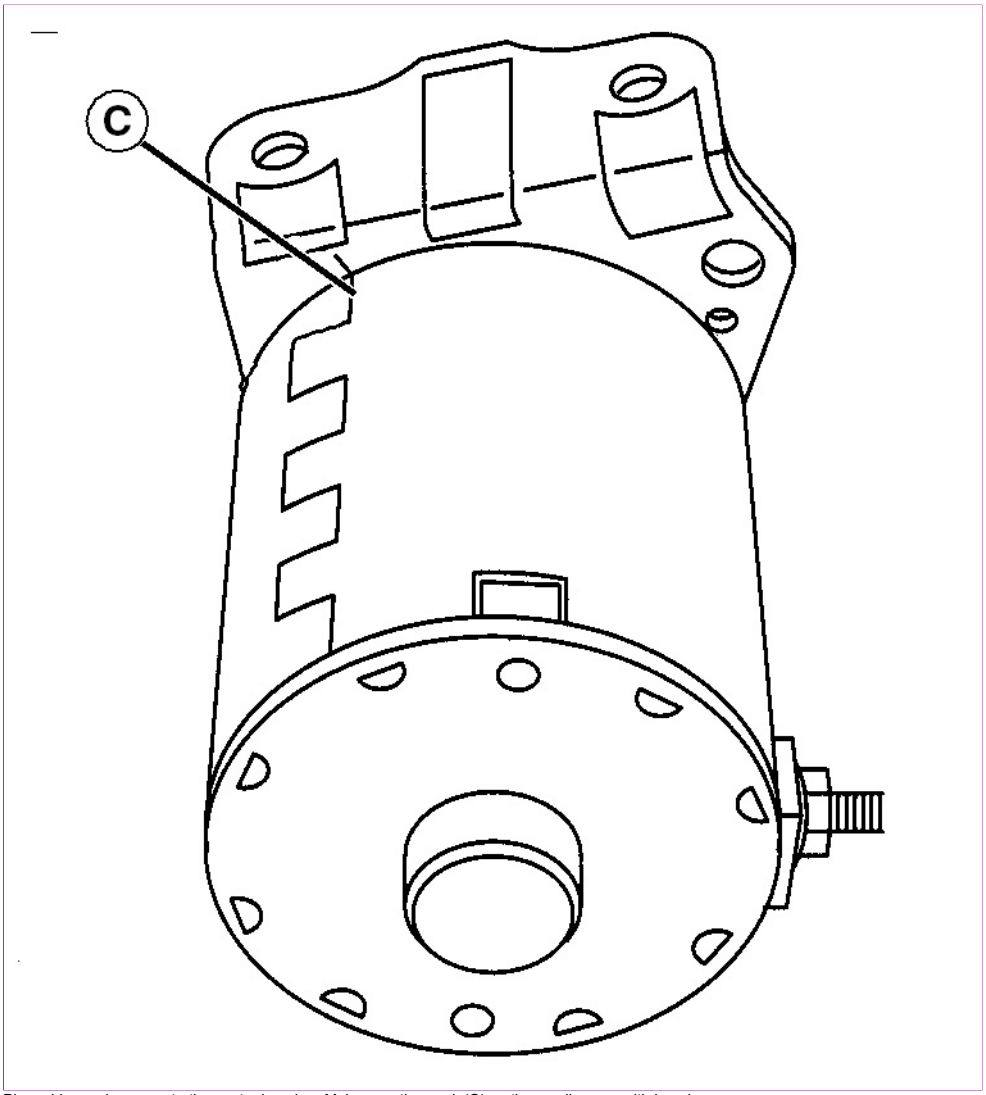
3. Install bearing end plate on armature commutator journal making sure plate indexes with brush holder.



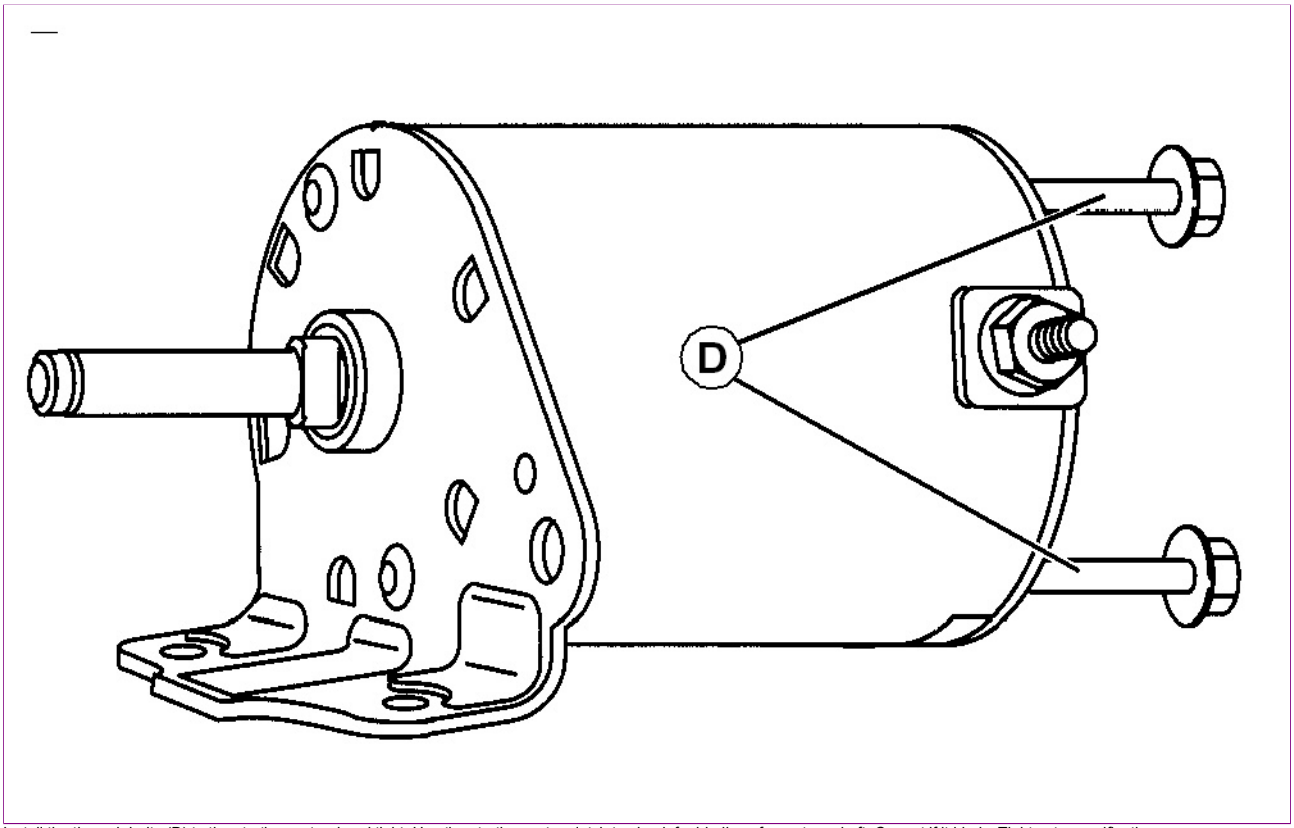
4. Slide motor housing over armature with the notch (B) toward brush holder.



5. Place wave washer on armature shaft with concave side up. Place flat washer on armature.



6. Place drive end cap on starting motor housing. Make sure the mark (C) on the cap lines up with housing seam.



7. Install the through bolts (D) to the starting motor, hand tight. Use the starting motor clutch to check for binding of armature shaft. Correct if it binds. Tighten to specification.
8. Install starting motor drive.
9. Install starting motor. Tighten bolts to specification.

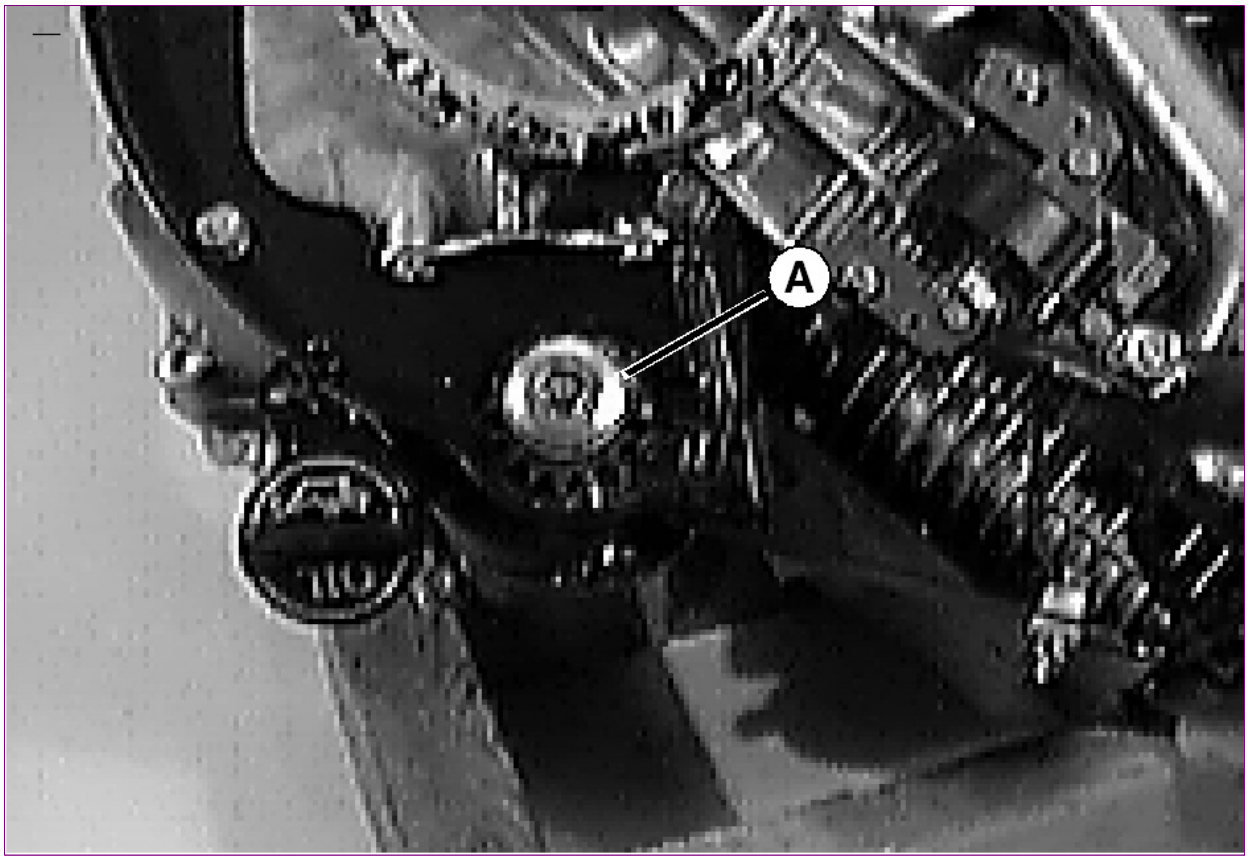
Item	Measurement	Specification
Specifications:		
Starter Bolts		16 N•m 140 lb-in.)
Through Bolts		6 N•m 50 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Motor Pinion Gear Replacement

Starting Motor Pinion Gear Replacement

Required Tools:

- JDG1087 C-Ring Remover
- JDG1086 C-Ring Installer



NOTE:

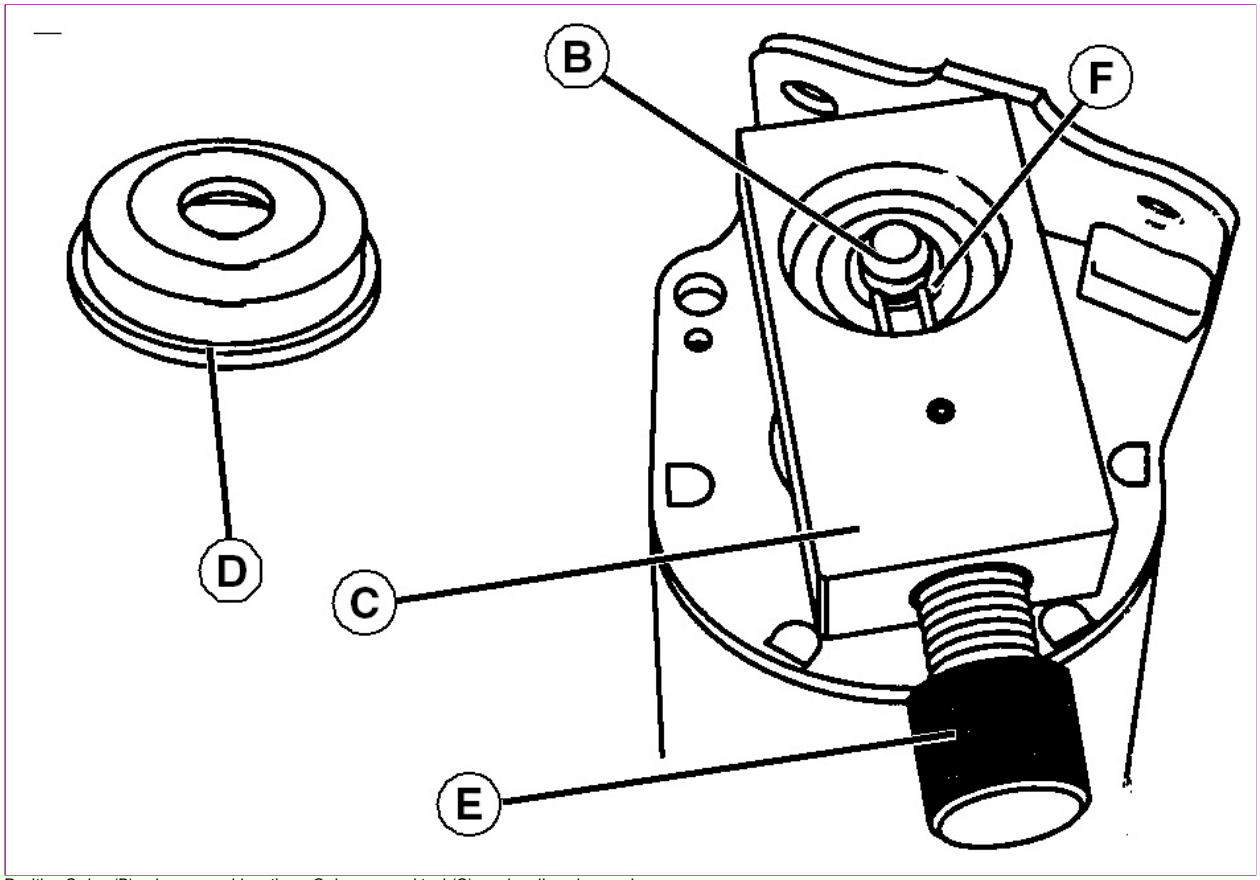
The starting motor does not have to be removed from the engine to replace the pinion gear (A).

Procedure:

1. Disconnect negative (-) battery cable.
2. Remove upper blower housing and flywheel.
3.

CAUTION:

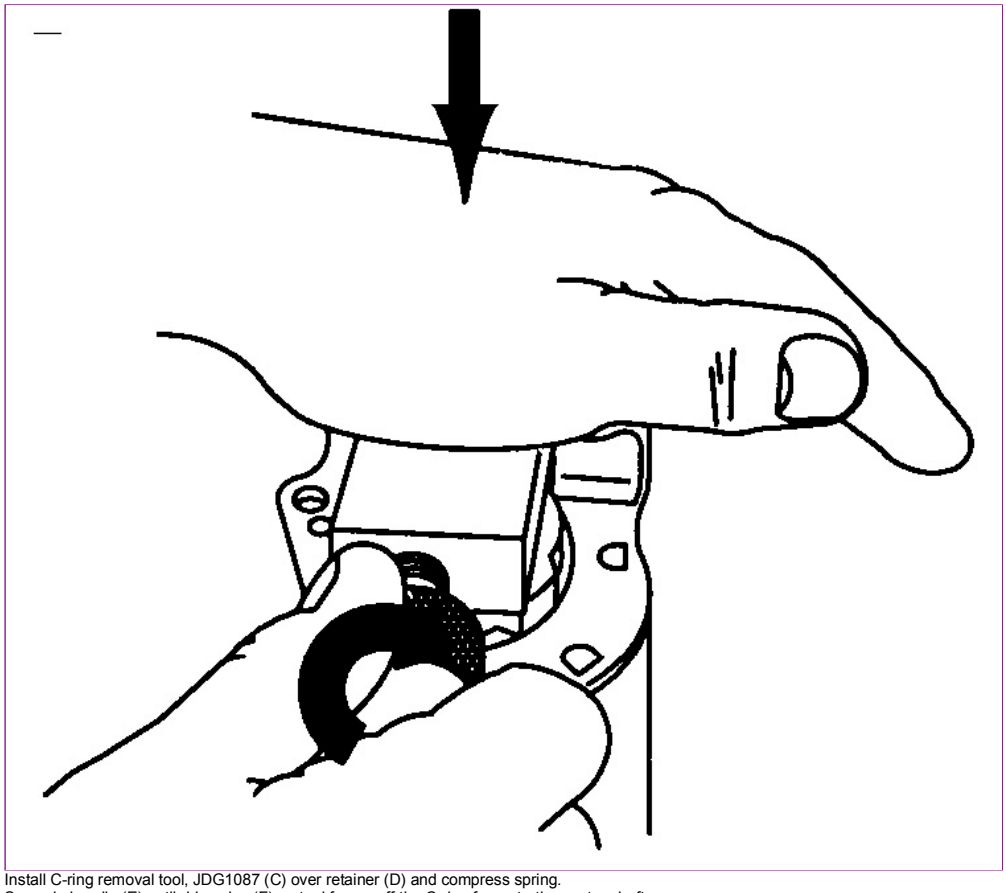
Components are installed under spring tension. Wear eye protection and use proper tools when installing and removing components with spring tension.



Position C-ring (B) using screw driver tip so C-ring removal tool (C) can be aligned properly.

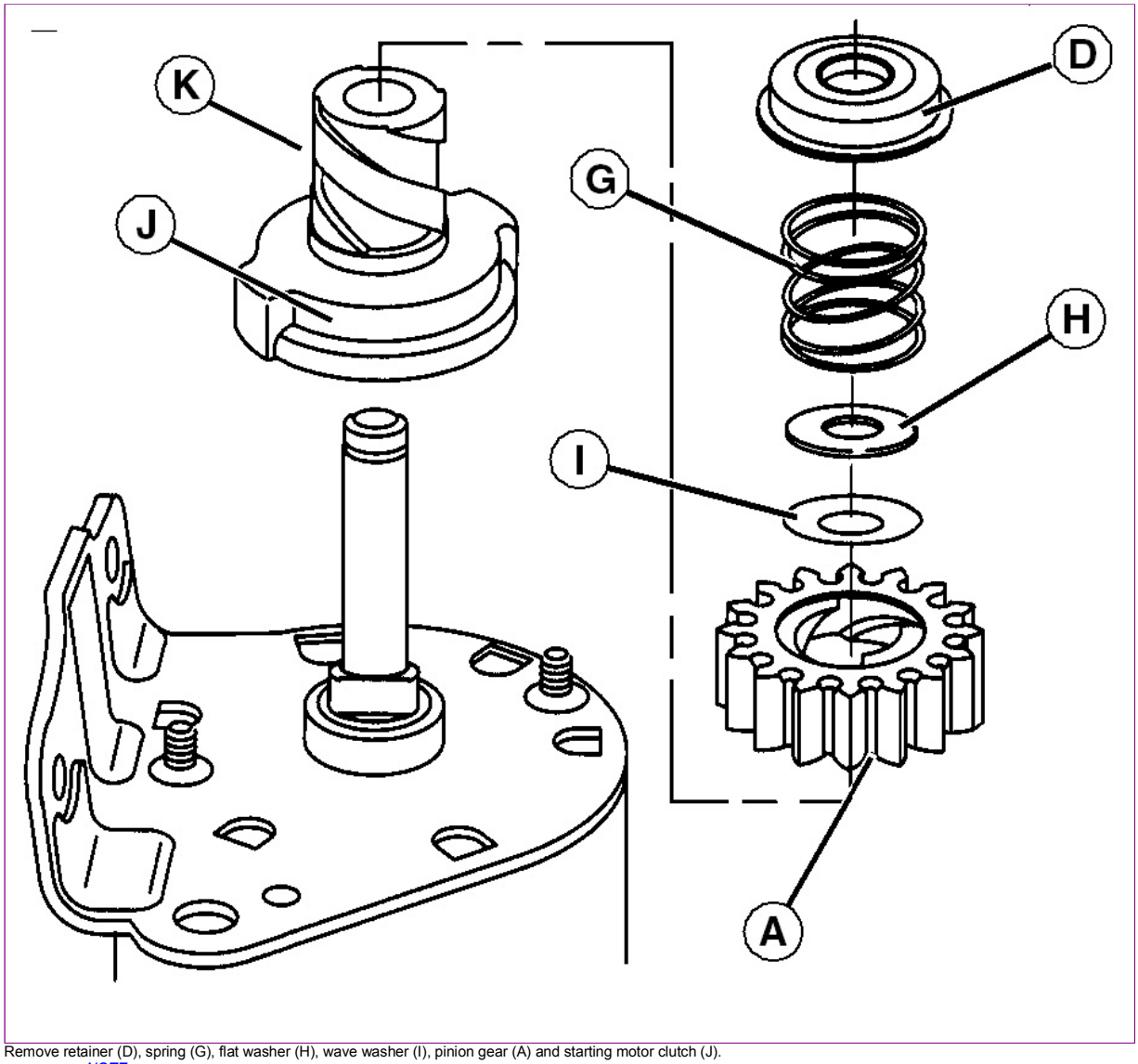
4. **IMPORTANT:**

   The C-ring (B) is not reusable.



Install C-ring removal tool, JDG1087 (C) over retainer (D) and compress spring.

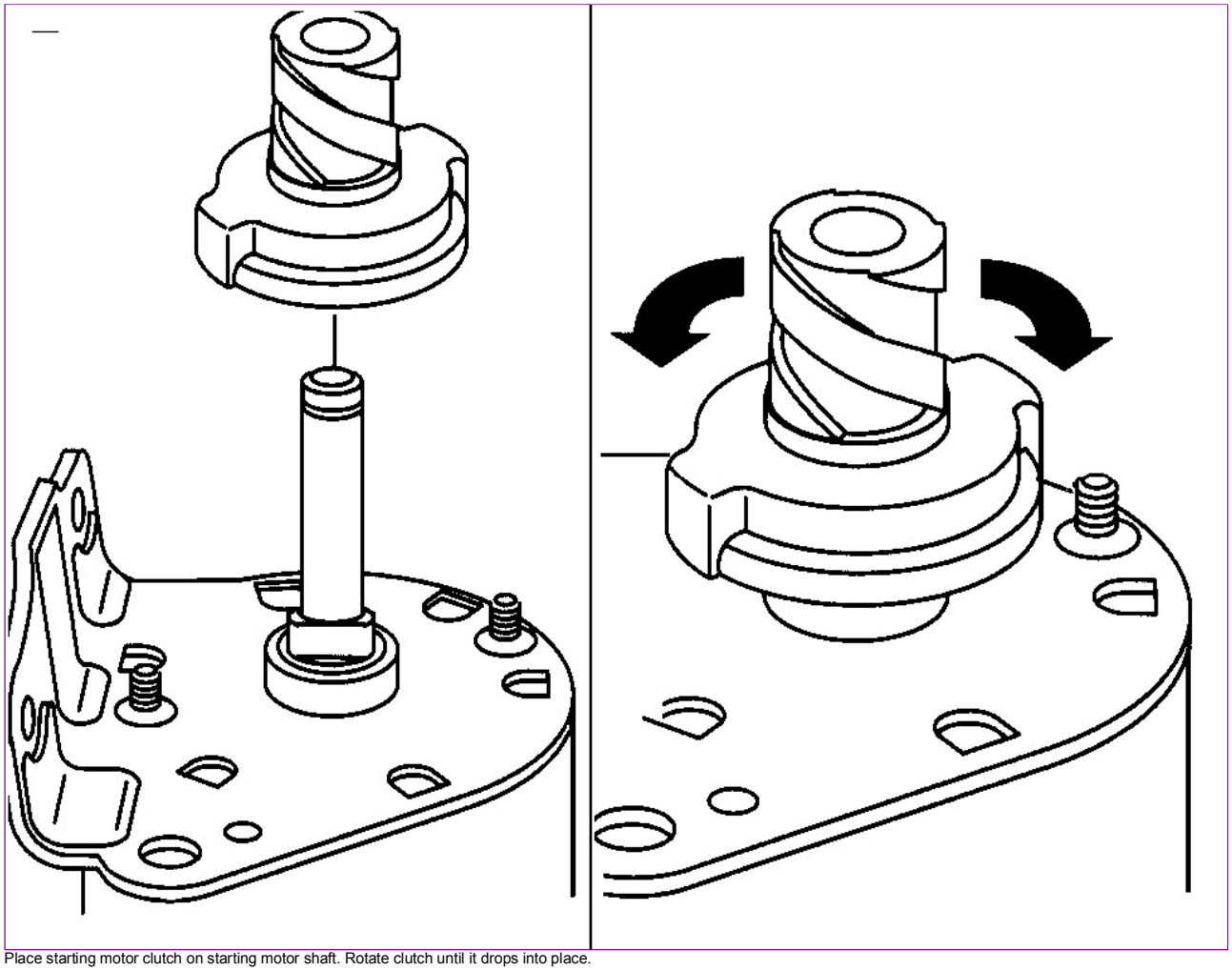
5. Screw in handle (E) until drive pins (F) on tool forces off the C-ring from starting motor shaft.



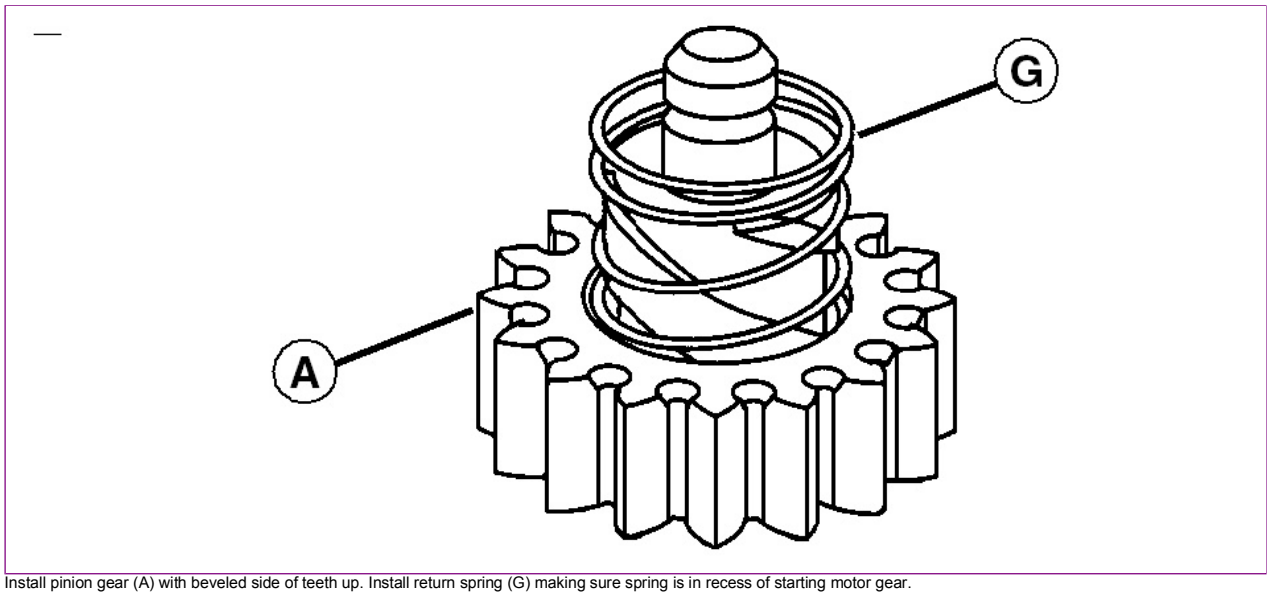
6. Remove retainer (D), spring (G), flat washer (H), wave washer (I), pinion gear (A) and starting motor clutch (J).
7. *NOTE:*

   Do not use mineral spirit based lubricants to lubricate helix.

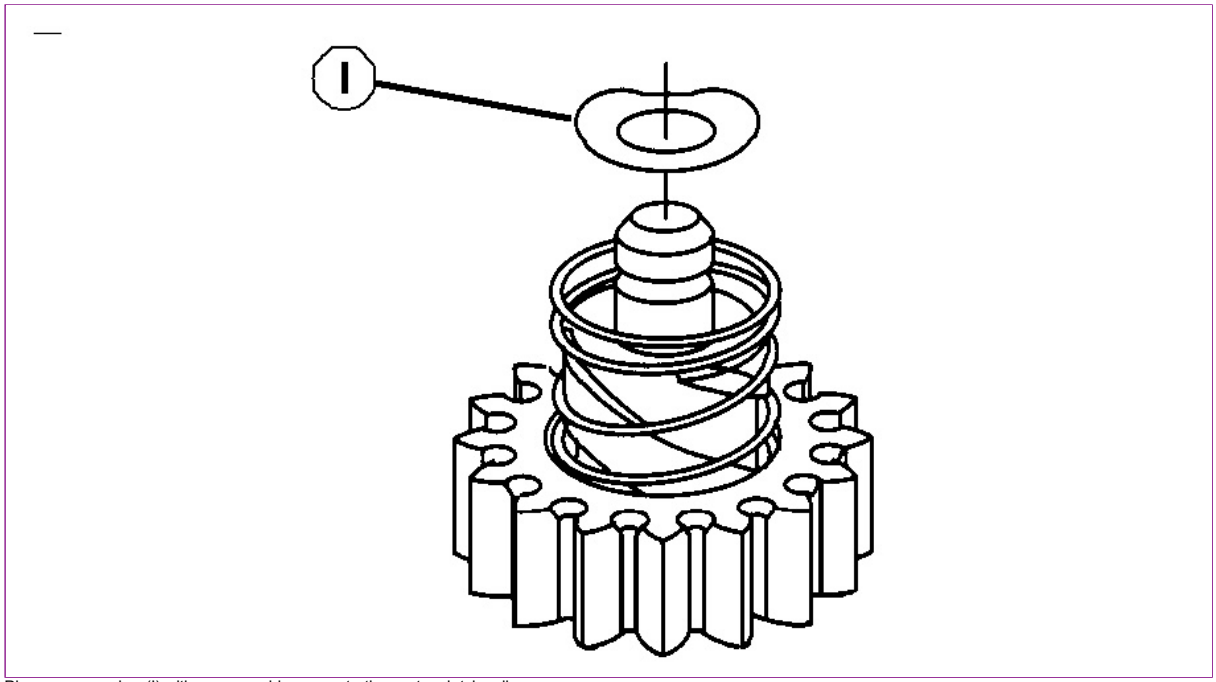
   Before installing starting motor clutch, apply lithium based lubricant sparingly around base of helix (K).



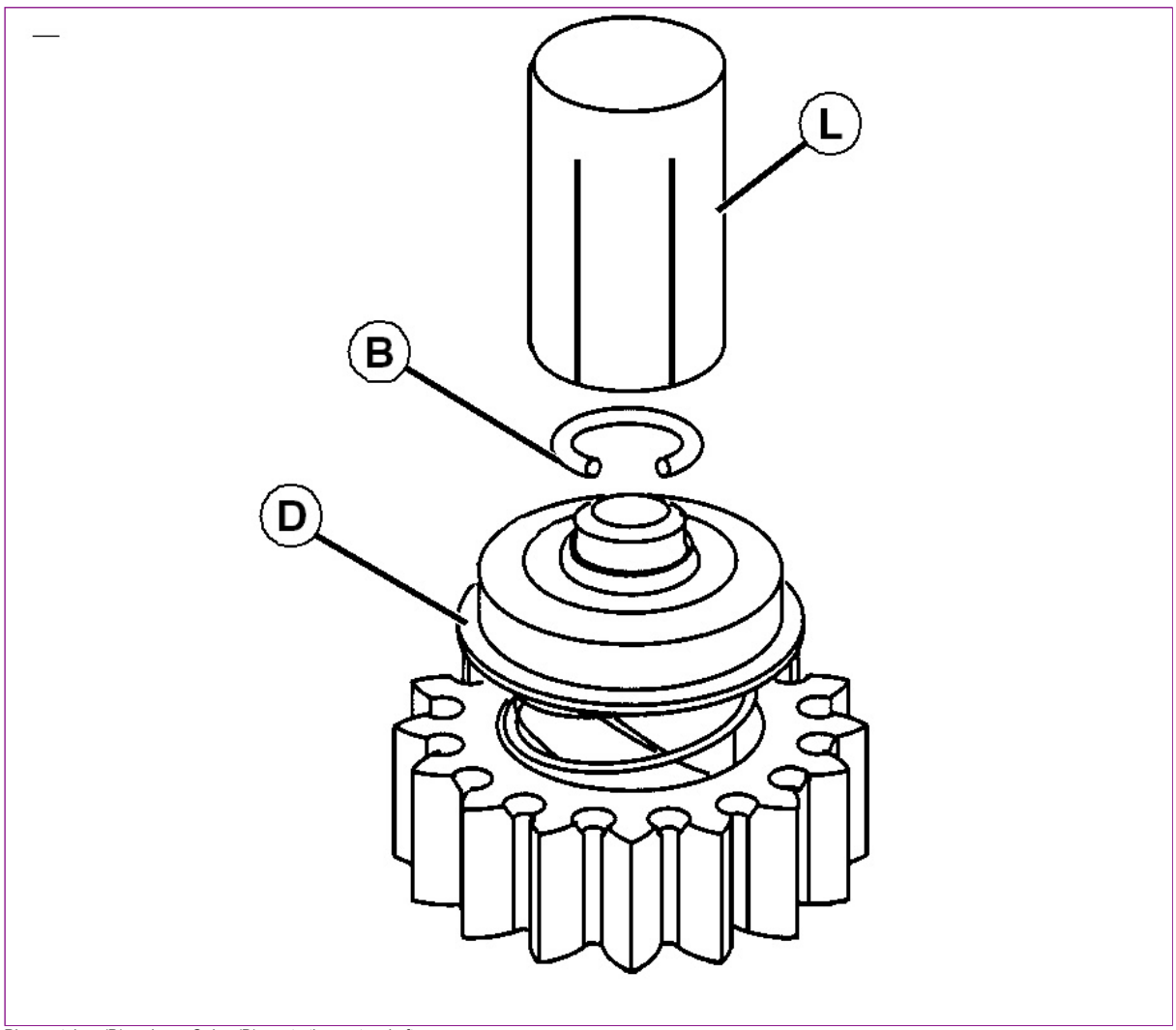
8. Place starting motor clutch on starting motor shaft. Rotate clutch until it drops into place.



9. Install pinion gear (A) with beveled side of teeth up. Install return spring (G) making sure spring is in recess of starting motor gear.



10. Place wave washer (I) with concave side up on starting motor clutch spline.



11. Place retainer (D) and new C-ring (B) on starting motor shaft.
12. Align one of the slots on the C-ring installer (L) with open end of C-ring.

13. Use a hammer to drive snap ring down until it engages groove in starting motor shaft. Then make sure retainer is all the way up against the snap ring.
14. Install flywheel, upper blower housing and reconnect negative (-) battery cable.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Engine Specifications

Engine Specifications

Item	Measurement	Specification
Specifications:		
Make		Briggs & Stratton
Series		Intek™ V-Twin
Type		Gasoline
Stroke/Cycle		4
Engine Model Numbers		407777 and 44P777
Cylinders		2
Valves		Overhead Valves
Displacement		725 cm^3 44.2 cu in.)
Bore		79.25 mm 3.120 in.)
Stroke		73.40 mm 2.890 in.)
Cooling System		Air Cooled
Lubrication		Pressurized
Oil Filter		Full Flow Filter (w/o By-Pass Valve)
Engine Oil (With Filter)		1.9 L (2.0 qt)
Engine Oil (Without Filter)		1.8 L (1.9 qt)
Air Cleaner		Paper with outer foam element
Muffler		Horizontal discharge below frame
Fuel Filter		Replaceable (In-Line Type)
Aspiration		Normal
Alternator (407777)		8 amp regulated
Alternator (44P777)		14 amp regulated

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Tests and Adjustments Specifications

Tests and Adjustments Specifications

Item	Measurement	Specification
Specifications:		
Slow Idle		1750 rpm
Governed Slow Idle		2200 ± 300 rpm
Fast Idle		3350 ± 100 rpm
Spark Plug Gap		0.76 mm 0.030 in.)
Spark Plug Torque		20 N•m 180 lb-in.)
Oil Pump Operating Pressure		103 - 345 kPa 15 - 50 psi)
Valve Clearance (Cold)		0.10 - 0.15 mm 0.004 - 0.006 in.)
Valve Guide Depth		7.10 mm 0.280 in.)
Armature Air Gap		0.20 - 0.30 mm 0.008 - 0.012 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Repair Specifications

Repair Specifications

Cylinder Bore, Pistons and Rings:

Item	Measurement	Specification
Cylinder Bore:		
Standard Dimension		79.25 mm 3.120 in.)
Wear Limit		79.35 mm 3.124 in.)
Piston Pin:		
Standard Dimension		17.07 - 17.09 mm 0.672 - 0.673 in.)
Wear Limit		17.07 mm 0.672 in.)
Piston Pin Bore:		
Standard Dimension		17.09 - 17.12 mm 0.673 - 0.674 in.)
Wear Limit		17.15 mm 0.675 in.)
Piston Rings:		
Ring Side Clearance (All - With new rings installed)		0.05 - 0.08 mm 0.002 - 0.003 in.)
Ring Wear Limit (All - With new rings installed)		0.12 mm (0.005 in.)
Ring End Gap:		
Top Ring Standard Dimension		0.13 - 0.33 mm 0.005 - 0.013 in.)
Center Ring Standard Dimension		0.36 - 0.56 mm 0.014 - 0.022 in.)
Oil Ring Standard Dimension		0.005 - 0.017 mm 0.13 - 0.43 in.)
Wear Limit (All)		0.76 mm 0.030 in.)

Valves:

Item	Measurement	Specification
Valve Guide:		
Standard Dimension		6.03 - 6.05 mm 0.237 - 0.238 in.)
Wear Limit		6.09 mm 0.240 in.)
Valve Stem Standard Dimension:		
Intake		5.97 - 5.98 mm 0.235 in.)
Exhaust		5.97 - 5.98 mm 0.235 in.)
Valve Stem Wear Limit:		
Intake		5.92 mm 0.233 in.)
Exhaust		5.92 mm 0.233 in.)
Valve Spring Free Length (minimum)		33.50 mm 1.319 in.)
Valve Seat		
Valve Seat Width		0.8 - 1.2 mm 0.031 - 0.047 in.)
Valve Margin		0.4 mm 0.016 in.)
Valve Face Angle		45
Valve Seat Narrowing Angle		15 from top/60 from bottom
Cylinder Head Warpage (maximum)		0.1 mm 0.004 in.)

Connecting Rod and Crankshaft:

Item	Measurement	Specification
Connecting Rod Crankpin Bearing:		
Standard Dimension		38.10 - 38.13 mm 1.500 - 1.501 in.)
Wear Limit		38.15 mm 1.502 in.)
Connecting Rod Piston Pin Bearing:		
Standard Dimension		17.07 - 17.09 mm 0.672 - 0.673 in.)
Wear Limit		17.15 mm 0.675 in.)
Crankshaft PTO Journal:		

Standard Dimension	41.25 - 41.28 mm 1.624 - 1.625 in.)
Wear Limit	41.22 mm 1.623 in.)
Crankshaft Magneto Journal:	
Standard Dimension	34.98 - 35.00 mm 1.377 - 1.378 in.)
Wear Limit	34.95 mm 1.376 in.)
Magneto Bearing:	
Standard Dimension	35.02 - 35.06 mm 1.379 - 1.380 in.)
Wear Limit	35.12 mm 1.383 in.)
PTO Bearing:	
Standard Dimension	41.33 - 41.35 mm 1.627 - 1.628 in.)
Wear Limit	41.38 mm 1.629 in.)
Crankshaft Crankpin Journal:	
Standard Dimension	38.05 - 38.07 mm 1.498 - 1.499 in.)
Wear Limit	38.01 mm 1.497 in.)
Cam Gear Journals (PTO and Magneto):	
Standard Dimension	12.67 - 12.70 mm 0.498 - 0.500 in.)
Wear Limit	12.64 mm 0.498 in.)
Crankshaft End Play	0.05 - 0.76 mm 0.002 - 0.030 in.)
Cam Lobe (Intake):	
Standard Dimension	31.19 - 31.27 mm 1.228 - 1.231 in.)
Wear Limit	31.12 mm 1.225 in.)
Cam Lobe (Exhaust):	
Standard Dimension	31.14 - 31.22 mm 1.226 - 1.229 in.)
Wear Limit	31.06 mm 1.223 in.)
Cam Bearing (Magneto Side):	
Standard Dimension	15.88 - 15.90 mm 0.625 - 0.626 in.)

Wear Limit	15.93 mm 0.627 in.)
Cam Bearing (PTO Side):	
Standard Dimension	12.70 - 12.73 mm 0.500 - 0.501 in.)
Wear Limit	12.75 mm 0.502 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Torque Specifications (Alphabetical)

Torque Specifications (Alphabetical)

Item	Measurement	Specification
Specifications:		
Alternator to Cylinder Block		2 Nm 20 lb in.)
Air Cleaner Base to Carburetor		7 N•m 65 lb-in.)
Armature Mounting Screws		3 N•m 25 lb-in.)
Back Plate (to cylinder)		11 N•m 100 lb-in.)
Blower Housing Screws		9 N•m 80 lb-in.)
Breather Screws		6 N•m 55 lb-in.)
Carburetor to Manifold		7 N•m 65 lb-in.)
Choke Cable Clamp		3 N•m 25 lb-in.)
Connecting Rod Cap Screws		11 N•m 100 lb-in.)
Crankcase Cover		23 N•m 200 lb-in.)
Cylinder Head Cap Screws		25 N•m 220 lb-in.)
Cylinder Shield		7 N•m 65 lb-in.)
Electric Clutch Mounting Bolt		75 N•m 55 lb-ft)
Engine Mounting Bolts		48 N•m 35 lb-ft)
Exhaust Manifold		16 N•m 140 lb-in.)
Fan Retainer Bolts		16 N•m 140 lb-in.)
Flywheel Nut		203 N•m 150 lb-ft)
Fuel Shutoff Solenoid		5 N•m 45 lb-in.)

Governor Control Bracket Bolts	9 N•m 80 lb-in.)
Governor Lever Nut	15 N•m 130 lb-in.)
Heat Shield Screws	7 N•m 65 lb-in.)
Intake Manifold Bolts	9 N•m 80 lb-in.)
Muffler to Frame	7 N•m 65 lb-in.)
Oil Filter Adaptor Mounting Bolts	7 N•m 65 lb-in.)
Oil Pump Cover Screws	6 N•m 50 lb-in.)
Rocker Arm Adjustment Lock Nut	7 N•m 60 lb-in.)
Rocker Support Screws	11 N•m 100 lb-in.)
Spark Plug	20 N•m 180 lb-in.)
Starting Motor Mounting Bolts	16 N•m 140 lb-in.)
Starting Motor Through Bolts	6 N•m 50 lb-in.)
Throttle Cable Clamp	3 N•m 25 lb-in.)
Traction Drive Belt Guard	7 N•m 65 lb-in.)
Valve Cover Cap Screws	11 N•m 100 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Special or Essential Tools

Special or Essential Tools

Digital Tachometer.....JT05719
Speed adjustments.

Cylinder Leak Tester.....JTO3502
Cylinder leakdown test.

Spark Tester Digital Pulse Tachometer.....D053515T
JT07270
Cylinder balance test.

Pressure Gauge Hose Assembly Connector.....JT07034 JT03017 JT05847
Oil pressure test.

Vacuum Gauge Bar Fitting Line and Plug.....JT03503JT05703 JT05699 and 8741-F66
Crankcase vacuum test.

Briggs & Stratton Flywheel Tool.....B&S Tool No. 19203
Remove flywheel.

NOTE:

Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).

Other Materials

Number	Name	Use
TY24416 (U.S.)	Multipurpose Lithium Grease	Apply to engine crankshaft, pack oil seals.
TY26181 (U.S.)	John Deere NEVER-SEEZ ™ Lubricant	Apply to crankshaft end.
(U.S.)	SCOTCH-BRIGHT ™ Abrasive Sheets/Pads	Clean cylinder head.
(U.S.)	Valve Guide Cleaner	Clean valve guides.
(U.S.)	Stanisol or Kerosene	Finish ream valve guide.
(U.S.)	Prussian Blue Compound	Check valve seat contact.
(U.S.)	Zinc Oxide/Wood Alcohol	Check block for cracks.
(U.S.)	Mineral Spirits	Clean electric starter armature.
PM37418 LOCTITE 242 (U.S.)	Thread Lock and Sealer (Medium Strength)	Apply to threads of throttle and choke plate screws.
PM40462 LOCTITE 587 Canada PM38616 (U.S.)	RTV Silicone Form-in-Place Gasket	Rocker arm cover mating surfaces.
PM37397LOCTITE 592 (U.S.)	Thread Sealant (General Purpose) with TEFLON,	Apply to threads of pipe plugs.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Engine Will Not Start

Engine Will Not Start

CAUTION:

Keep away from all moving parts when testing. The engine may start to rotate at any time.

NOTE:

To test specific electrical components, see Electrical section and refer to either Diagnostics or Tests and Adjustments for further guidance.

Symptom	Problem	Solution
Engine Will Not Crank	Battery	Charge and test battery. See Battery Voltage and Specific Gravity Tests in the Electrical section.
		Replace the battery if it will not take or hold a charge.
	Starting Motor Solenoid does not click when ignition switch is turned to start position.	Cranking circuit problem. See Cranking Circuit Diagnosis - All Models in the Electrical section.
		Key switch malfunction. See Key Switch Test in the Electrical section.
		Starting motor solenoid malfunction. See Starting Solenoid Test - All Models in the Electrical section.

CAUTION:

Do not rotate engine with starter if the spark plug is removed. Gasoline spray from the open cylinder may be ignited by ignition spark and cause an explosion or fire.

NOTE:

Perform a visual inspection first to determine if battery cables are tight and not corroded and if battery is of sufficient size to turn the engine over at minimum cranking speed of 350 rpm.

Symptom	Problem	Solution
Engine Cranks But Will Not Start	Engine cranks slowly.	Charge and test battery. See Battery Voltage and Specific Gravity Tests in the Electrical section.
		Replace the battery if it will not hold a charge.
	Poor or no spark at spark plug.	Replace spark plug,
		Ignition coil gap incorrect. See Ignition Armature Air Gap Adjustment .
		Magneto shorted to ground, flywheel magnet weak.
	Choke or throttle not adjusted properly.	Adjust cable. See Choke Cable Adjustment and See Throttle Cable Adjustment .
	Fuel supply.	Check air cleaner, fuel mixture, possible contaminated fuel, or stuck float needle.
		Check fuel shutoff valve, fuel lines, fuel pump, and engine vacuum.
	Fuel shutoff solenoid does not open when ignition switch is turned to start/run.	Check fuel solenoid and ignition circuit. See Ignition and Shutoff Circuit Diagnosis - All Models and See Fuel Shutoff Solenoid Test in the Electrical section.
	Valve clearance improperly.	Check and adjust valve clearance. See Valve Clearance Adjustment .
	Internal components binding.	Remove spark plug and turn the engine over by hand. If the engine is hard to turn over by hand repair or replace engine.

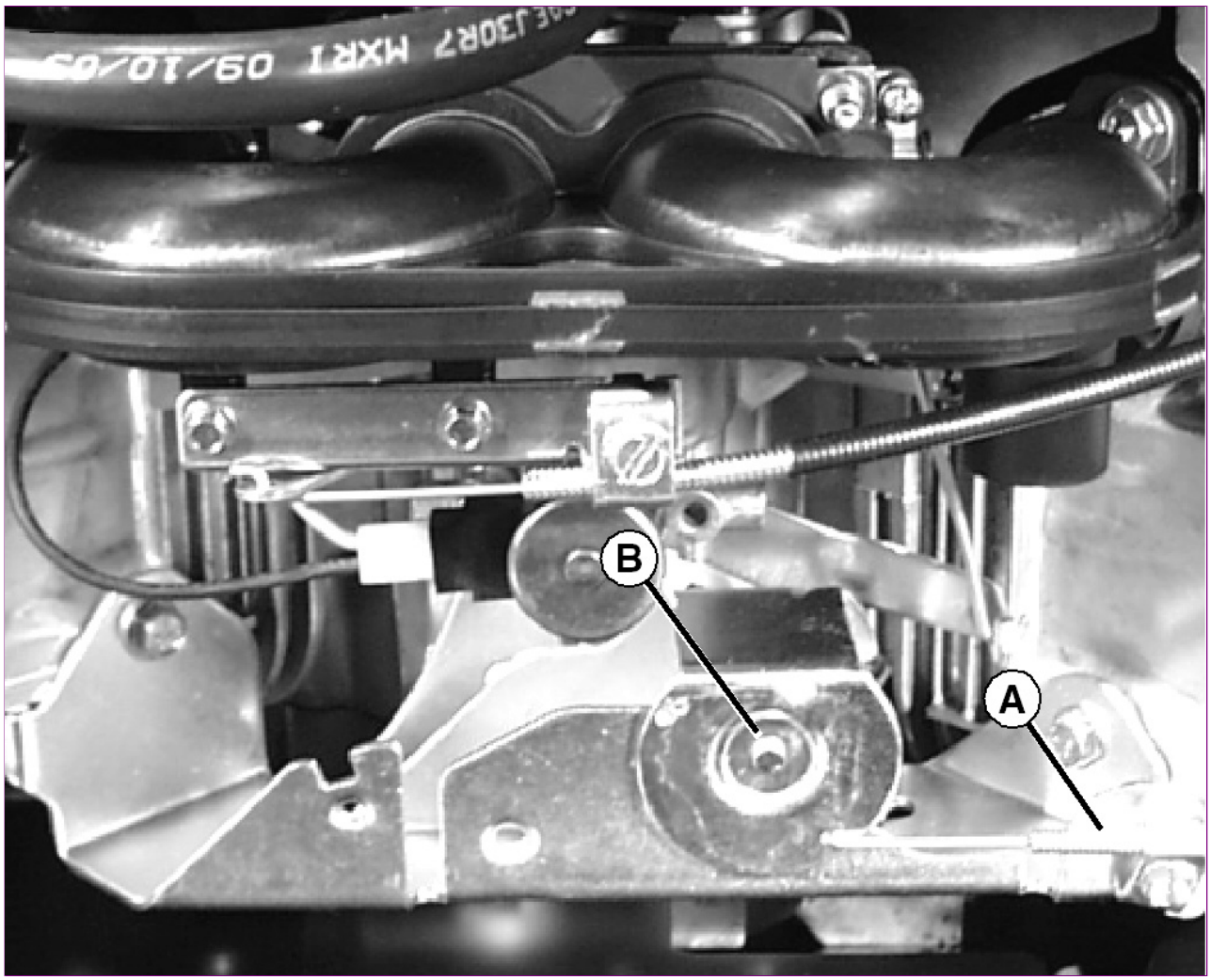
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Throttle Cable Adjustment

Throttle Cable Adjustment

Reason:

To make sure the throttle cable moves the throttle through its full range of movement.

Procedure:

1. Move throttle lever to FAST position (detent).
2. Loosen throttle cable clamp.
3. 

Move throttle cable (A) until governor control swivel (B) is at end of travel.
4. Tighten throttle cable clamp to specification.

Item	Measurement	Specification
Specification:		
Throttle Cable Clamp		3 N•m 25 lb-in.)

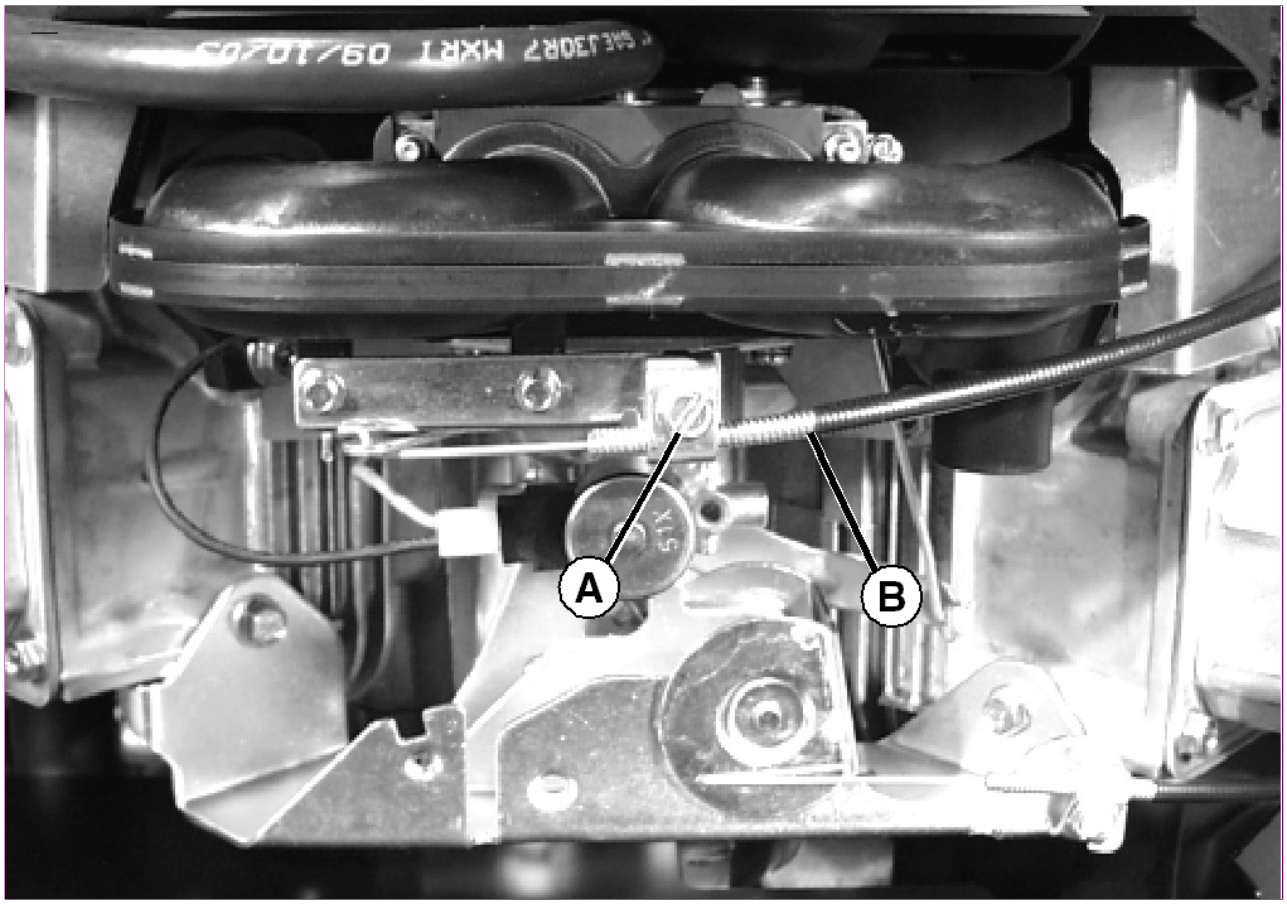
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Choke Cable Adjustment

Choke Cable Adjustment

Reason:

To make sure the choke cable moves the choke through its full range of movement.

Procedure:

1. Place choke lever in the full OFF position (detent).
2. 

Loosen choke cable clamp (A).
3. Move choke cable and housing (B) until choke is fully open.
4. Tighten choke cable clamp to specification.
5. Move lever through full range of motion. Make sure choke opens and closes completely. Readjust if necessary.

Item	Measurement	Specification
Specification:		
Choke Cable Clamp		3 N•m 25 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Throttle/Choke Cable Adjustment - All Models

Throttle/Choke Cable Adjustment - All Models

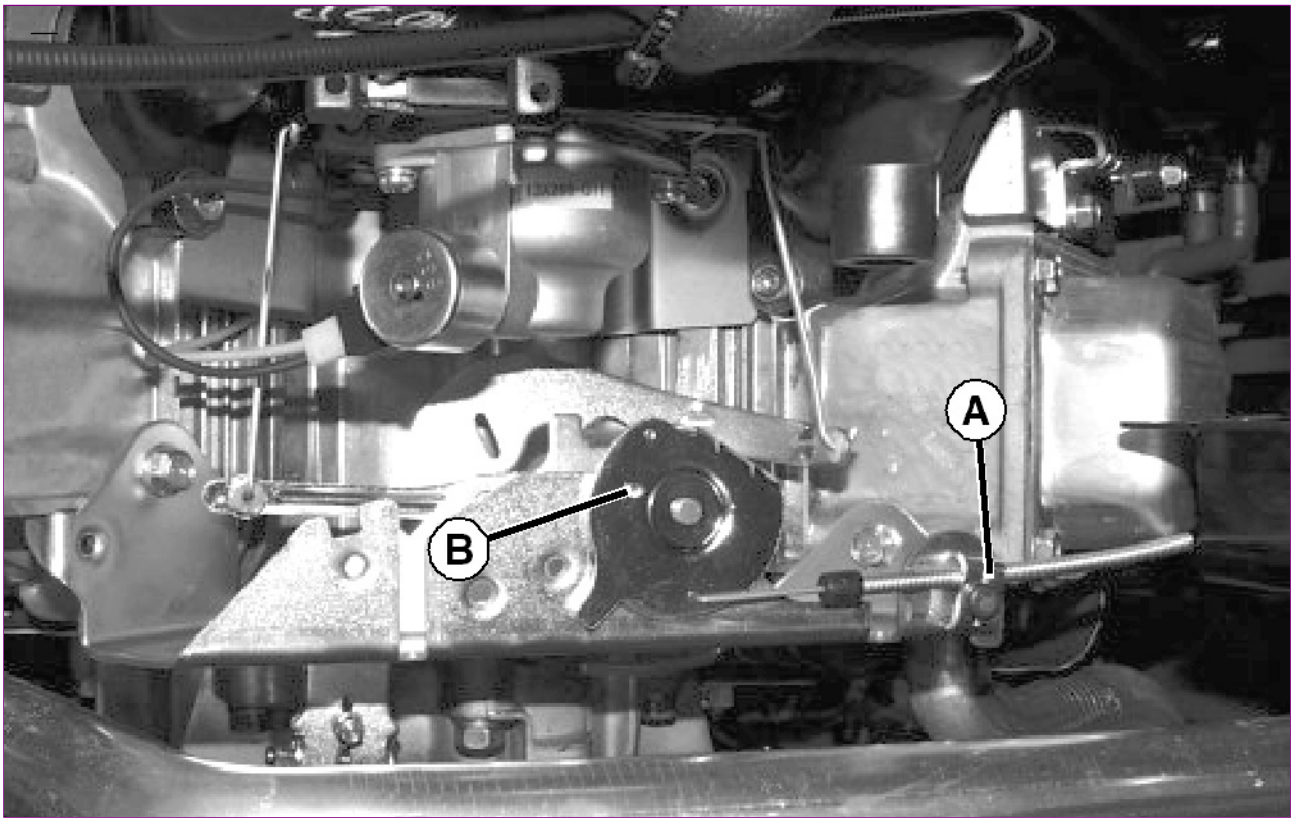
Reason:

To ensure that the combined throttle/choke cable moves both throttle and choke through their full range of movement.

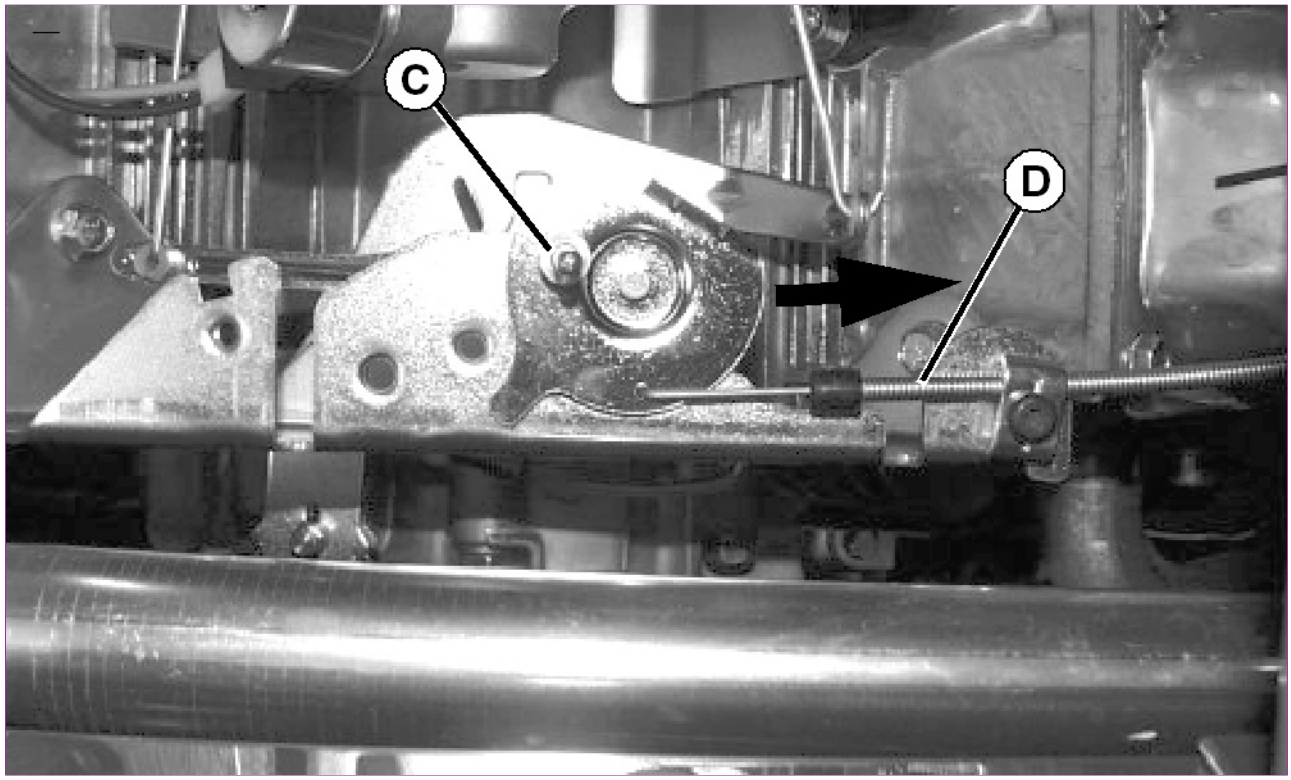
Equipment:

- 2.90mm (0.115) Diameter Rivet M67899

Procedure:

1. Park machine safely. See “Park Machine Safely” in the Safety section.
2. Move throttle lever up into the Choke position, then back down to the Full throttle position (in the detent).
3. 

Loosen throttle/choke cable housing clamp (A).



4. Line up holes in lever and bracket at (B).
5. Insert Rivet (C) into holes. Keep tool perpendicular to lever.
6. *NOTE:*

   Make sure throttle plate hole is aligned, and throttle lever is in detent position while removing slack and clamping.

   Pull slack in cable (D) away from carburetor, and tighten clamp on cable to specification.
7. Remove Rivet, and check to make sure throttle lever moves freely up into choke position.

Item	Measurement	Specification
Specification:		
Throttle/Choke Cable Clamp		3 N•m 25 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Fuel Shutoff Solenoid Test

Fuel Shutoff Solenoid Test

Reason:

To test operation of fuel shutoff solenoid.

Required Tools:

- Jumper wire

Procedure:

1. Listen for an audible click when ignition switch is turned from OFF to ON.
2. If solenoid does not click, problem could be in equipment wiring.
3. Disconnect wire from solenoid.
4. Momentarily place a jumper wire from solenoid wire to battery positive terminal.
5. If solenoid now clicks, the solenoid is working properly.

NOTE:

If battery voltage drops below 9 volts when cranking engine or while engine is running, the solenoid will not function.

Results:

- Solenoid is operating properly if a click is heard when ignition switched from OFF to ON.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Governor Static Adjustment

Governor Static Adjustment

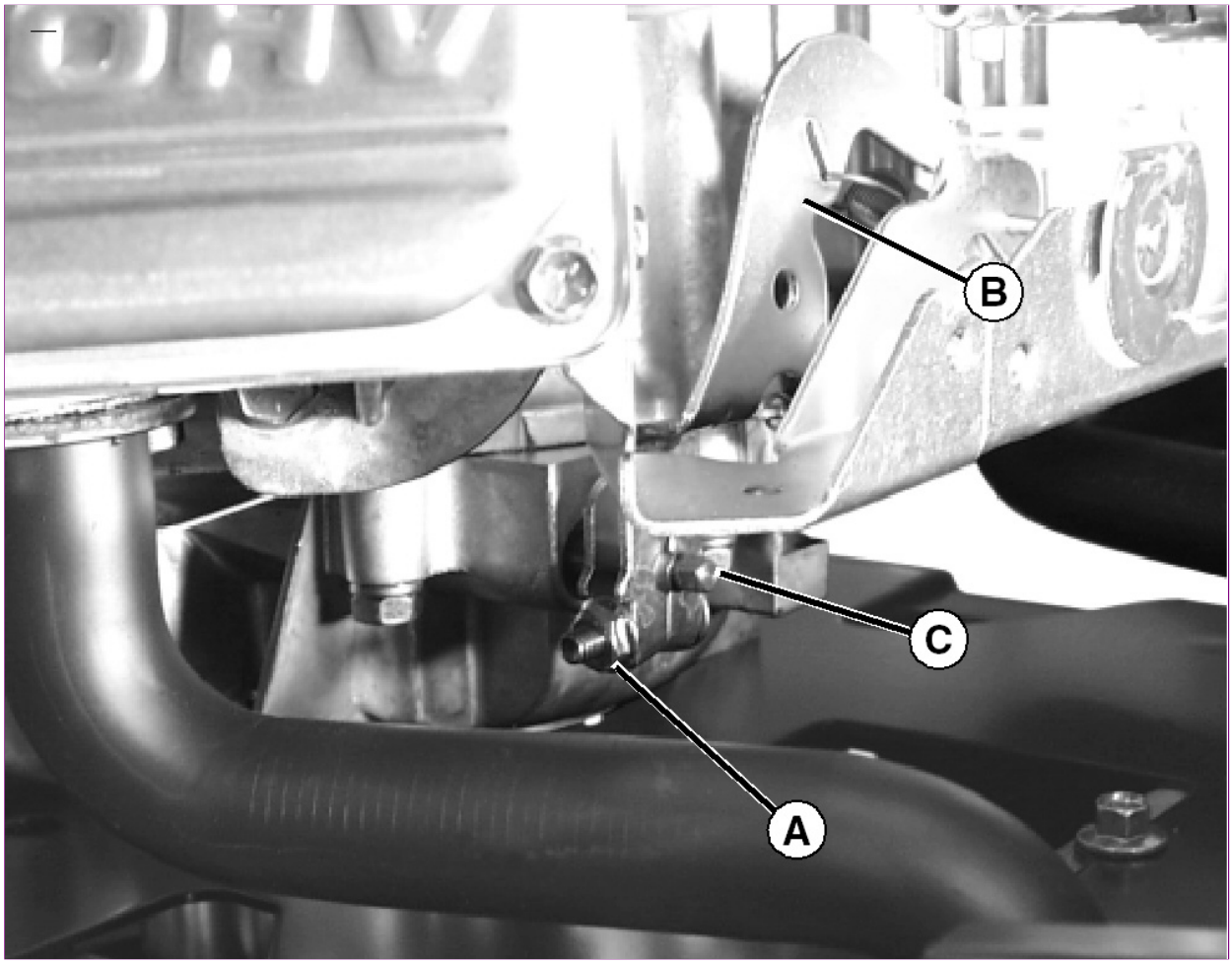
CAUTION:

Before starting or running engine, static adjustment of the governor must be made. Failure to make static adjustments first, could result in engine overspeeding, and may result in engine or equipment damage, personal injury and/or property damage.

(Engine OFF)

All linkages must be installed to make adjustment.

Procedure:

1. Remove hood and top muffler shield.
2. 

Loosen governor lever bolt and nut (A).
3. Push on governor lever (B) until throttle is wide open.
4. Do not bend governor link or distort governor lever.
5. Hold lever in this position and rotate governor shaft (C) clockwise as far as it will go. Hold lever and shaft in position and tighten governor lever bolt and nut to specification.

Item	Measurement	Specification
Specification:		
Governor Lever Nut		15 N•m 130 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Governor Dynamic Adjustment

Governor Dynamic Adjustment

(Engine Running)

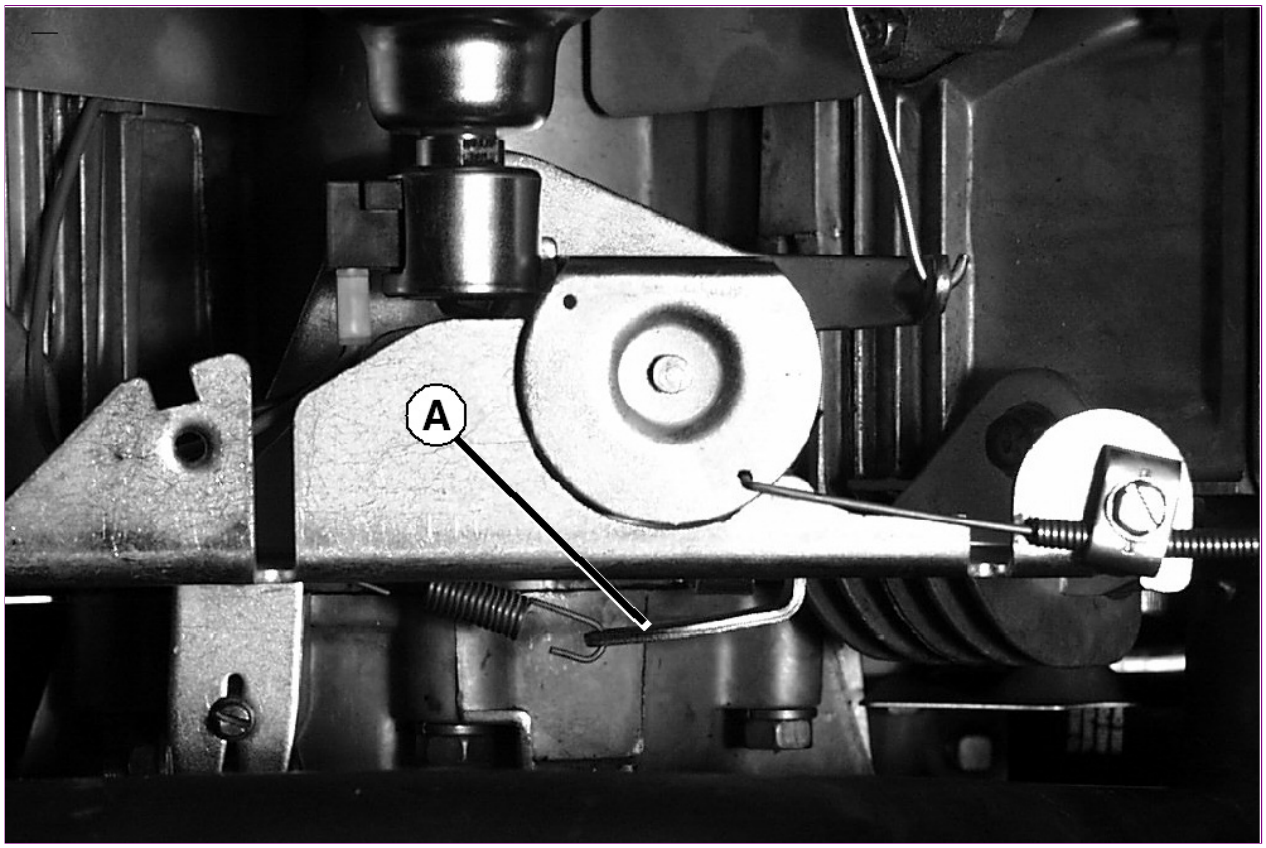
Equipment:

- JD07270 Pulse Tachometer; or,JTO5719 Photo Tachometer

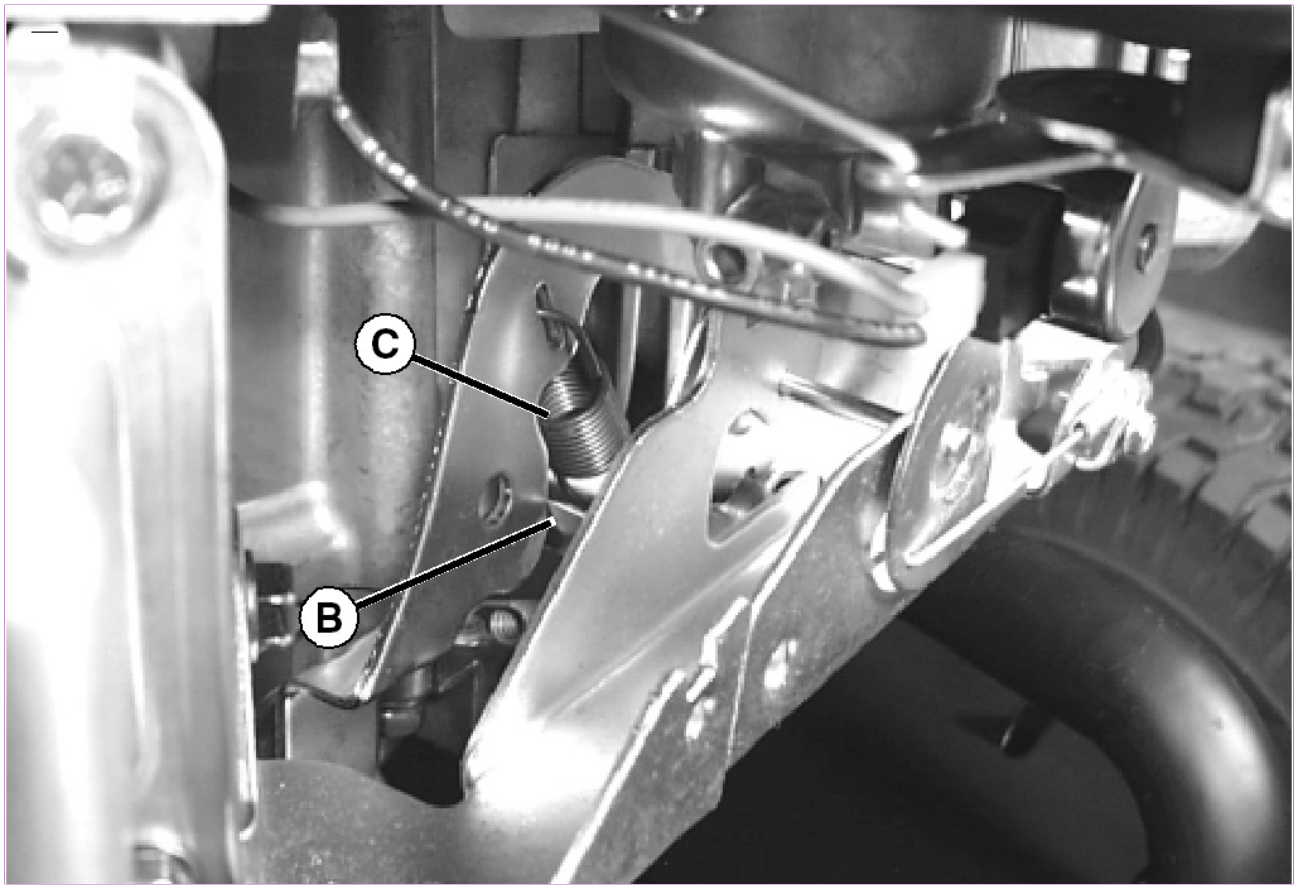
Procedure:

1. **IMPORTANT:**

   When servicing engine (with engine running), remove hood to avoid damage from muffler exhaust heat.

   Remove hood assembly.
2. Start engine, and move throttle lever to SLOW position.
3. 

   Bend governor idle tang (A) to obtain a governed low idle. Bending tang down increases rpm, bending up decreases rpm.



4. With throttle lever in SLOW position and engine running at governed idle, bend throttle restrictor tang (B) so that it just contacts the governor lever (C).
5. Move throttle lever to FAST position. Bend fast idle tang (lower end of fast idle spring) to obtain top no load engine speed of 3350 rpm.

Item	Measurement	Specification
Specification:		
Governed Low Idle		2200 ± 300 rpm
Fast Idle		3350 ± 100 rpm

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Crankcase Vacuum Test

Crankcase Vacuum Test

Reason:

To determine operation of breather, condition of seals, gaskets, rings, piston, and cylinder wall.

Equipment:

- JTO3503 Vacuum Gauge
- JTO5703 Barb Fitting
- JTO5699 Line
- 8741-F66 Plug

Procedure:

1. Park machine safely
2. Raise hood and remove oil dipstick.
3. Place plug and barbed fitting in dipstick tube until tight.
4. Cover barbed fitting with a plug or finger and start engine.
5. Quickly remove plug or finger from barbed fitting and attach hose and gauge.
6. Run engine at fast idle and record reading on gauge.
7. Run engine at slow idle. Do not turn engine off.
8. Disconnect hose and quickly place plug or finger over barbed fitting.
9. Turn engine off.
10. Remove plug and install oil dipstick.

Results:

If crankcase vacuum is less than specification, check:

- breather reed valve clearance and condition.
- seals and gaskets for leakage.
- valve cover gasket for leakage.
- rings, piston and cylinder wall for wear or damage.
- valve and valve seats for wear or damage.
- head warp.

Item	Measurement	Specification
Crankcase Vacuum (minimum):		
Water Movement		25.4 cm 10 in.)
Hg (mercury) Movement		18.7 mm 0.74 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Leakdown Test

Cylinder Leakdown Test

Reason:

To check sealing of piston rings and cylinder bore.

Required Tools:

- JTO3502 Cylinder Leak Tester
- Breaker Bar and 32 mm Socket

IMPORTANT:

Check and adjust the valves to ensure the valves have not been adjusted too tight. If either valve is off its seat, the leak test will be invalid.

NOTE:

If the directions that come with the tester being used are different than the following, use the directions that came with the tester.

Procedure:

1. Warm engine to operating temperature, then stop engine.
2. ---

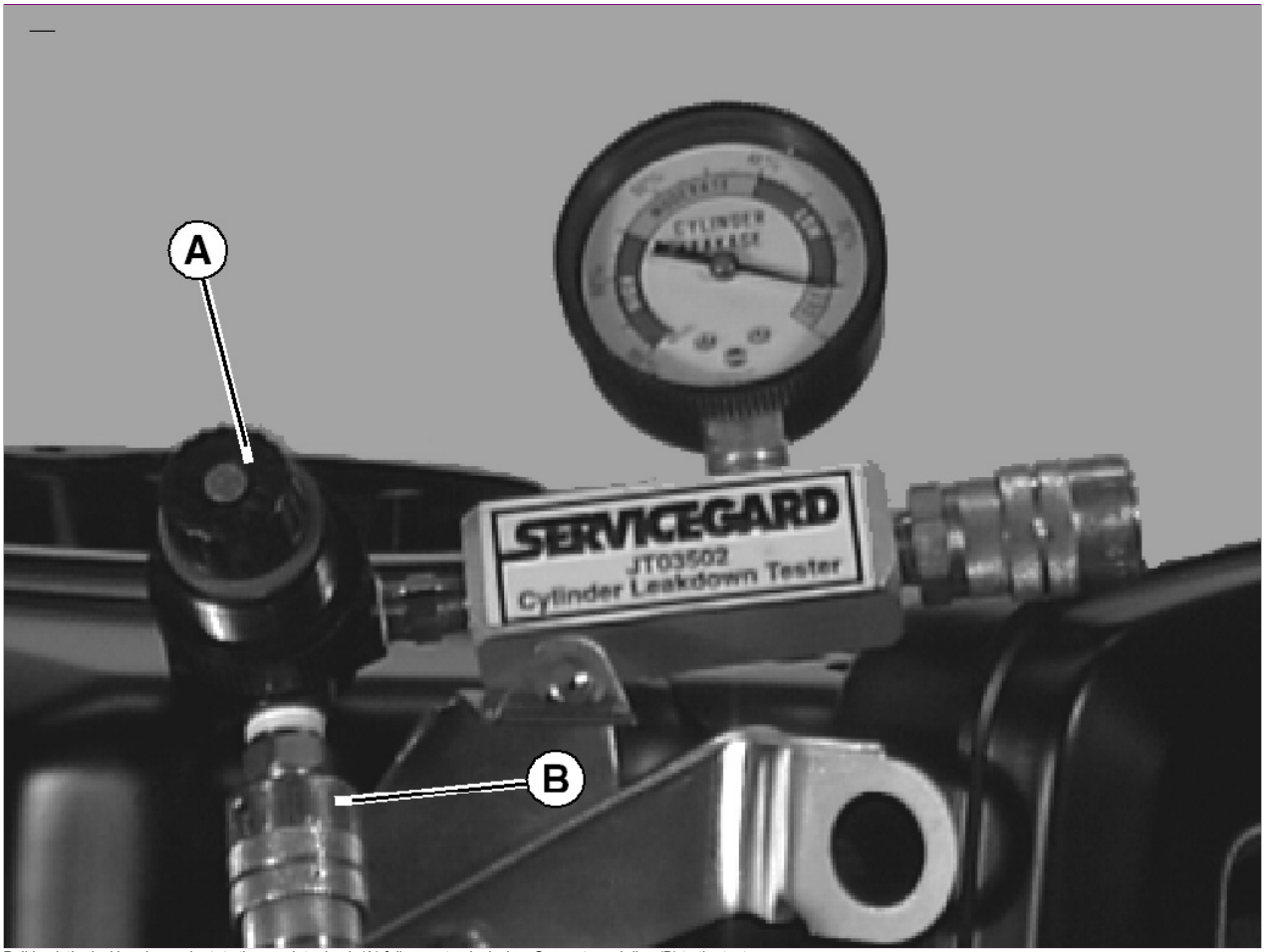
   CAUTION:

   With spark plugs removed, the magnetos must be grounded to the engine to prevent a spark that could ignite anything combustible.

   Remove spark plugs. Ground the magnetos by attaching a jumper wire from the magneto kill circuit connector to the engine to prevent a spark that could ignite anything combustible.
3. Remove air cleaner element from engine so you can listen for air leaks through carburetor.
4. Remove valve covers.
5. Remove the rotating screen.
6. **IMPORTANT:**

   The piston must be positioned at Top Dead Center (TDC) to ensure that the intake valves are away from the compression relief balls. If not, the intake valve will be open and the leak test will be invalid.

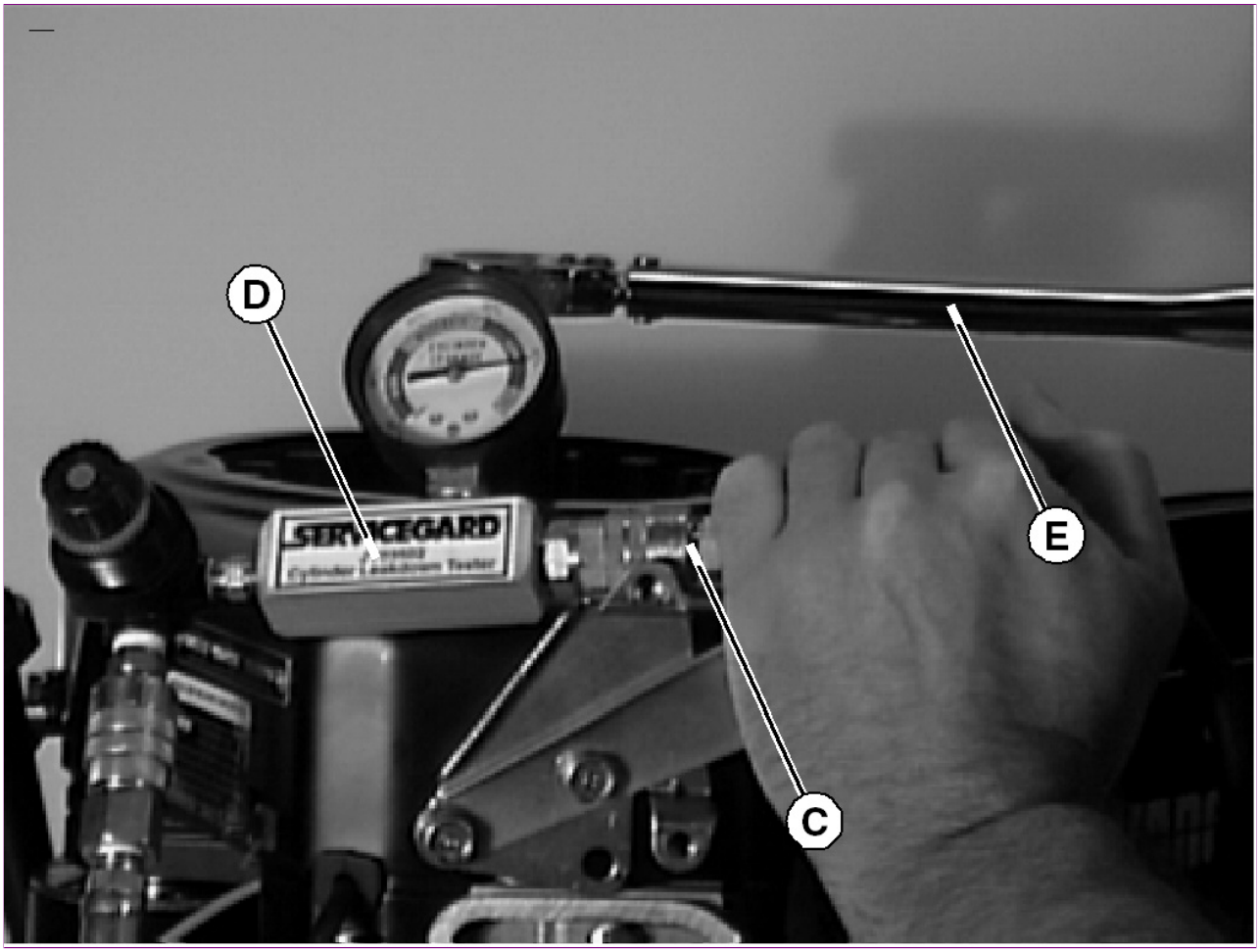
   Turn crankshaft until piston is at TDC on the compression stroke (both valves closed).
7. Screw the adaptor into the spark plug hole but do not attach it to the tester at this time.



8. Pull back the locking ring and rotate the regulator knob (A) fully counterclockwise. Connect an air line (B) to the tester.
9. **IMPORTANT:**

   The air supply must have enough supply pressure to calibrate the tester, usually 586 - 655 kPa (85 - 95 psi).

   Pull back the locking ring and rotate the regulator knob clockwise until the gauge needle rests in the SET range of the gauge. Push the locking ring towards the tester to lock it.

10. 

Connect the adaptor hose (C) to the tester (D), and record the needle position while holding the flywheel in position with a breaker bar (E).

Results:

- *NOTE:*

  A small amount of air escaping from the crankcase breather is normal.

  Excessive air escaping from the crankcase breather indicates worn piston rings or cylinder wall, or leaking head gasket.
- Air escaping from the carburetor indicates a worn intake valve or seat.
- Air escaping from the exhaust pipe indicates a worn exhaust valve or seat.
- Gauge reading in the Green (low) area indicates good compression. (Less than 25% is considered normal.)
- Gauge reading in the Yellow (moderate) area indicates borderline compression. The engine is still usable but an overhaul should be considered.
- Gauge reading in the Red (high) area indicates excessive compression loss. Engine overhaul is necessary.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Balance Test

Cylinder Balance Test

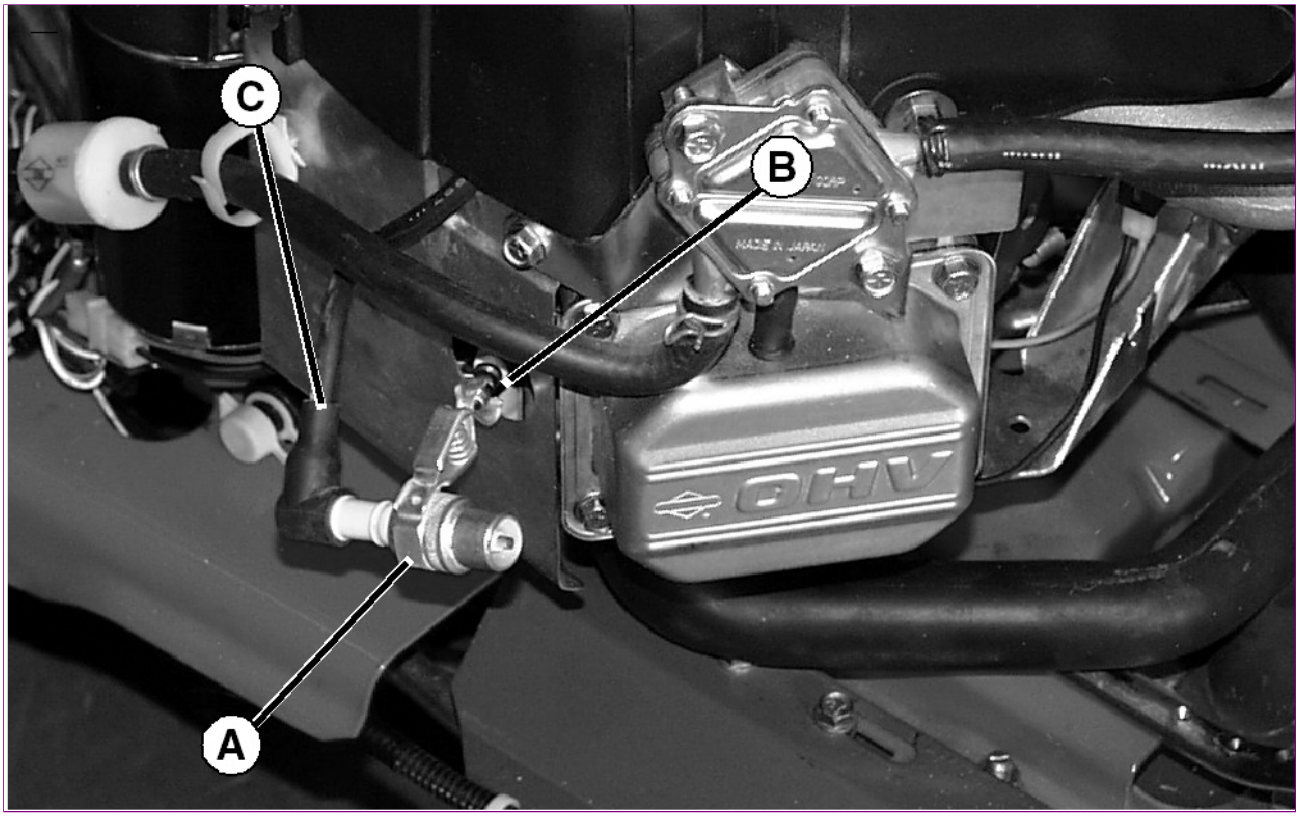
Reason:

If engine is hard starting, runs rough, misses or lacks power, run a cylinder balance test to determine if both cylinders are operating to their full potential.

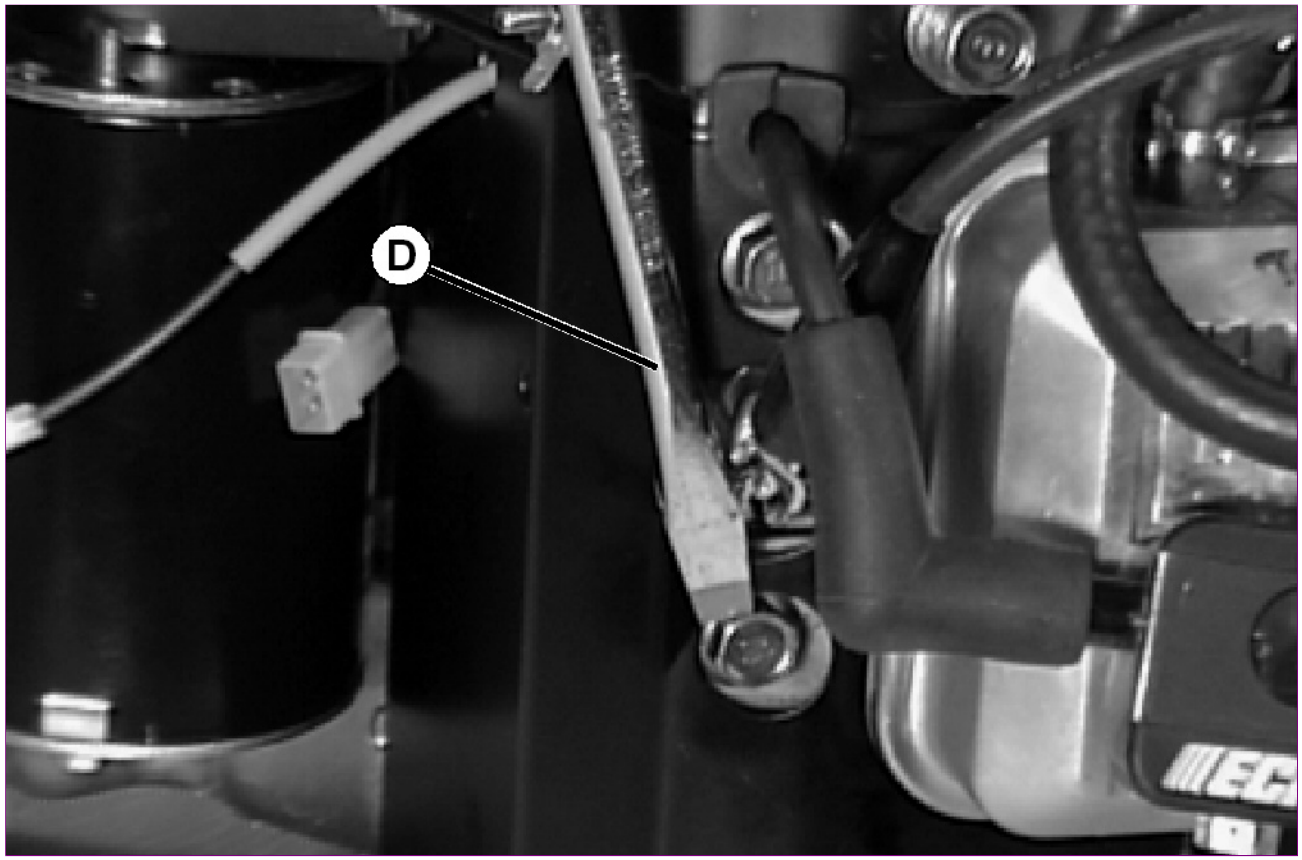
Tools:

- D053515T Spark Tester
- JT07270 Engine Tachometer
- Screwdriver with insulated handle

Procedure:

1. Remove hood assembly.
2. Disconnect spark plug high tension lead.
3. 

Connect spark tester (B) to spark plug (A) and high tension lead (C).
4. Start engine and note spark at tester. Shut engine off.
5. Repeat steps 1 - 3 for second cylinder.
6. Connect engine tachometer.
7. Start engine and run at top no load speed. Note rpm on tachometer.

8. 

   Ground out one cylinder with screwdriver (D). Note rpm on tachometer.
9. Remove screwdriver and allow engine to recover.
10. Ground second cylinder with screwdriver. Note rpm on tachometer.

Results:

- If the difference between the two cylinders is less than 75 rpm, the cylinders are considered equal.
- If the difference between the two cylinders is greater than 75 rpm, the cylinder with the least rpm loss is weakest, and is the potential problem.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Ignition Armature Air Gap Adjustment

Ignition Armature Air Gap Adjustment

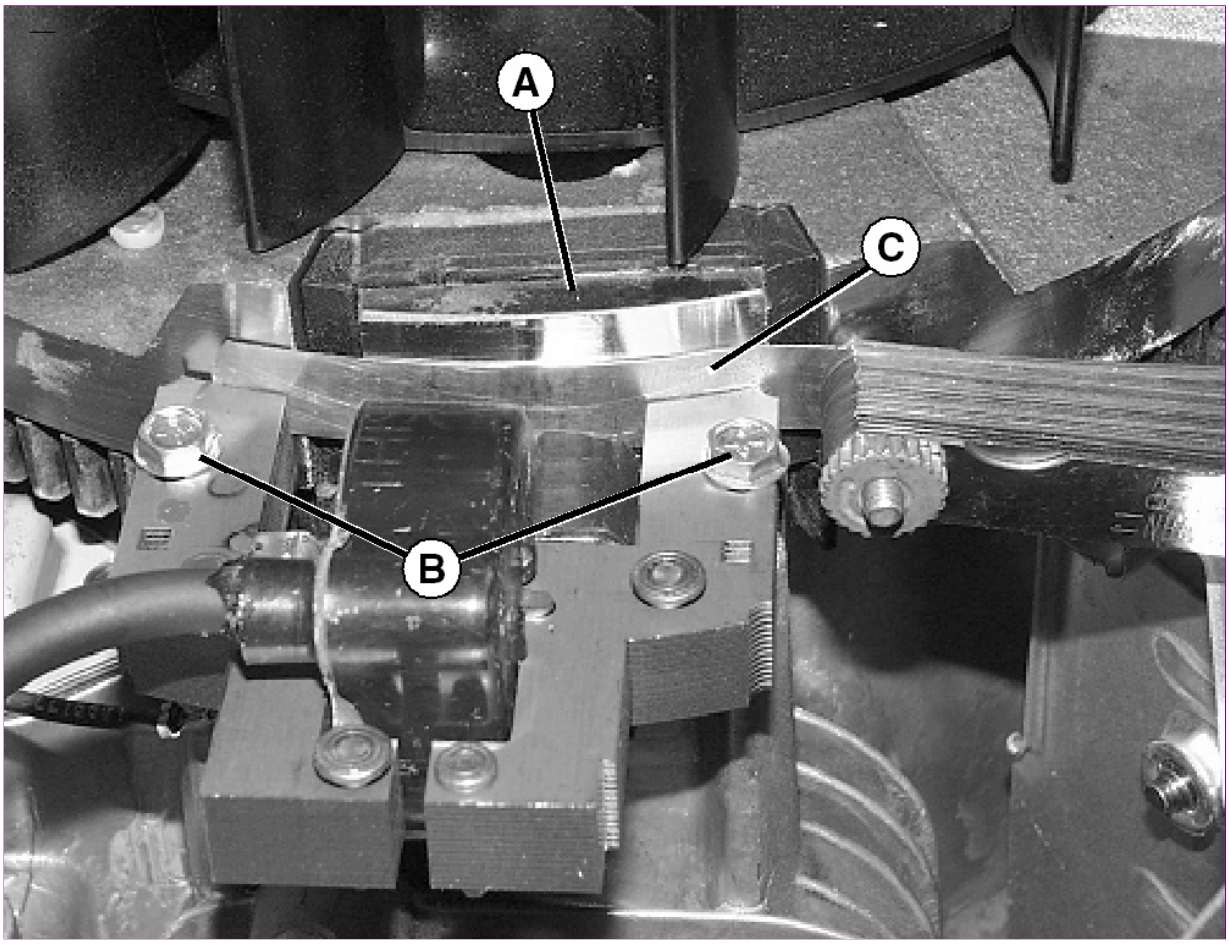
Reason:

To set the ignition air gap for proper operation and timing of the ignition system.

Equipment:

- 0.25 mm (0.010 in.) Thickness Gauge

Procedure:



1. Rotate flywheel until magnet (A) is away from armature laminations.
2. Loosen the armature mounting screws (B) and slide armature away from flywheel as far as possible.
3. Tighten one screw enough to hold the armature in place.
4. Rotate flywheel until magnet is directly under armature laminations.
5. Place a **0.25 mm (0.010 in.)** thickness gauge (C) between armature and magnet.
6. Loosen the mounting screw so magnet will pull armature against thickness gauge.
7. Tighten both mounting screws (B) to specification.
8. Rotate flywheel while pulling thickness gauge out from between the armature and the magnet.
9. Repeat procedure for the remaining ignition armature.

Item	Measurement	Specification
Specifications:		
Armature Air Gap		0.20 - 0.30 mm 0.008 - 0.012 in.)
Armature Mounting Screws		3 N•m 25 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Valve Clearance Adjustment

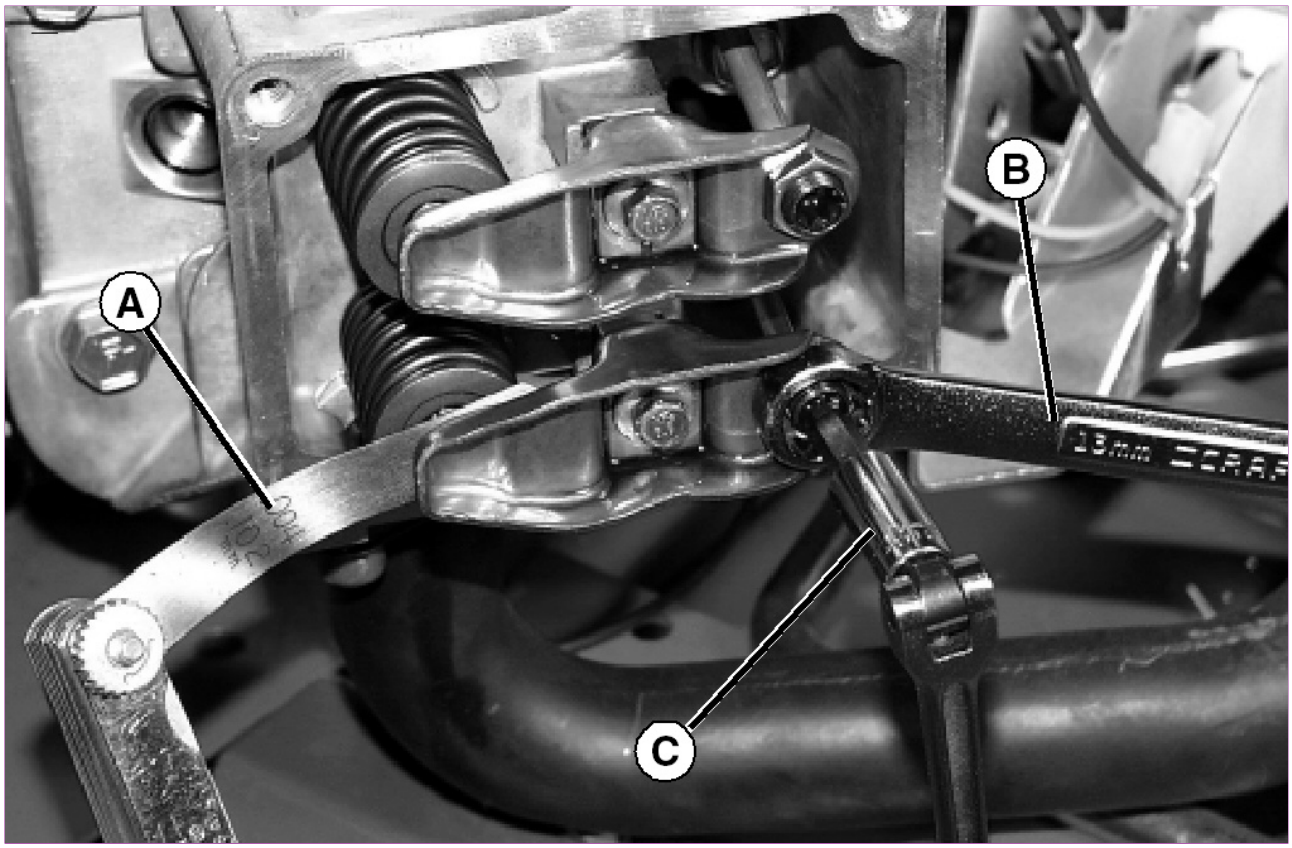
Valve Clearance Adjustment

NOTE:

Correct position of crankshaft is necessary to eliminate interference by the compression release mechanism when adjusting valve clearance.

Procedure:

1. Key switch must be OFF.
2. Engine must be cold for accurate adjustment.
3. Remove both valve covers.
4. Remove spark plugs.
5. Identify cylinder #1. It is the cylinder on the starting motor side.
6. Turn crankshaft until cylinder #1 piston is at top-dead-center (TDC) on the compression stroke.
   - Rotate the flywheel clockwise and watch the action of the valves. The compression stroke is after the intake valve closes and the piston is approaching the top of the cylinder.
   - Insert a dowel or blunt pencil through the spark plug opening until it touches the top of the piston. Slowly turn the flywheel and find the TDC of the piston travel.
   - Using a paint pen, make a small mark on the flywheel and the blower housing to indicate cylinder #1 TDC.
   - Using the dowel or pencil, rotate the flywheel so that the piston travels 6.4 mm (o.25 in.) downward and past TDC.
   - Mark the blower housing with this location. This is where the valve settings **must** be performed. This ensures that the automatic compression release lobes on the camshaft do not affect the adjustment



7. Start with the #1 cylinder. Loosen the valve adjusting nut.
8. Check valve clearance with a 0.10 mm (0.004 in.) feeler gauge (A) between valve stem and rocker arm. Do not insert the feeler gauge farther than needed, as contact between gauge and other parts of the rocker can cause inaccurate readings.
9. With the feeler gauge in place, turn the adjuster nut using a 5 mm hex wrench (C) while holding the nut with a 13 mm open end wrench (B) until the feeler gauge is “snug”. Do not remove the feeler gauge yet.
10. Tighten the adjuster lock nut finger tight, then to specification.
11. Remove the feeler gauge and recheck clearance using the 0.1 mm (0.004 in.) feeler gauge and then a 0.13 mm (0.005 in.) and 0.15 mm (0.006 in.) feeler gauge.
    - The 0.1 mm (0.004 in.) feeler gauge should be somewhat loose.
    - The 0.13 mm (0.005 in.) feeler gauge should be “snug”.
    - The 0.15 mm (0.006 in.) feeler gauge should not fit.
12. If this is the case, the valve is set properly. If this is not the case, repeat steps until the proper adjustment is made.
13. *NOTE:*

    The flywheel will need to be turned 270 degrees to find the TDC of the compression stroke. Be careful not to set the valves for the #2 cylinder on TDC of the exhaust stroke.

    Repeat procedure for the #2 cylinder.
14. Install spark plugs. Tighten to specification
15. Install valve covers. Tighten to specification.

Item	Measurement	Specification
Specifications:		
Lock Nut		7 N•m 62 lb-in.)

Valve Clearance	0.10 - 0.13 mm 0.004 - 0.005 in.)
Spark Plug Torque	20 N•m 180 lb-in.)
Valve Cover Cap Screws	11 N•m 100 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Engine Oil Pressure Test

Engine Oil Pressure Test

Reason:

To verify that the engine has enough oil pressure to lubricate the internal engine components.

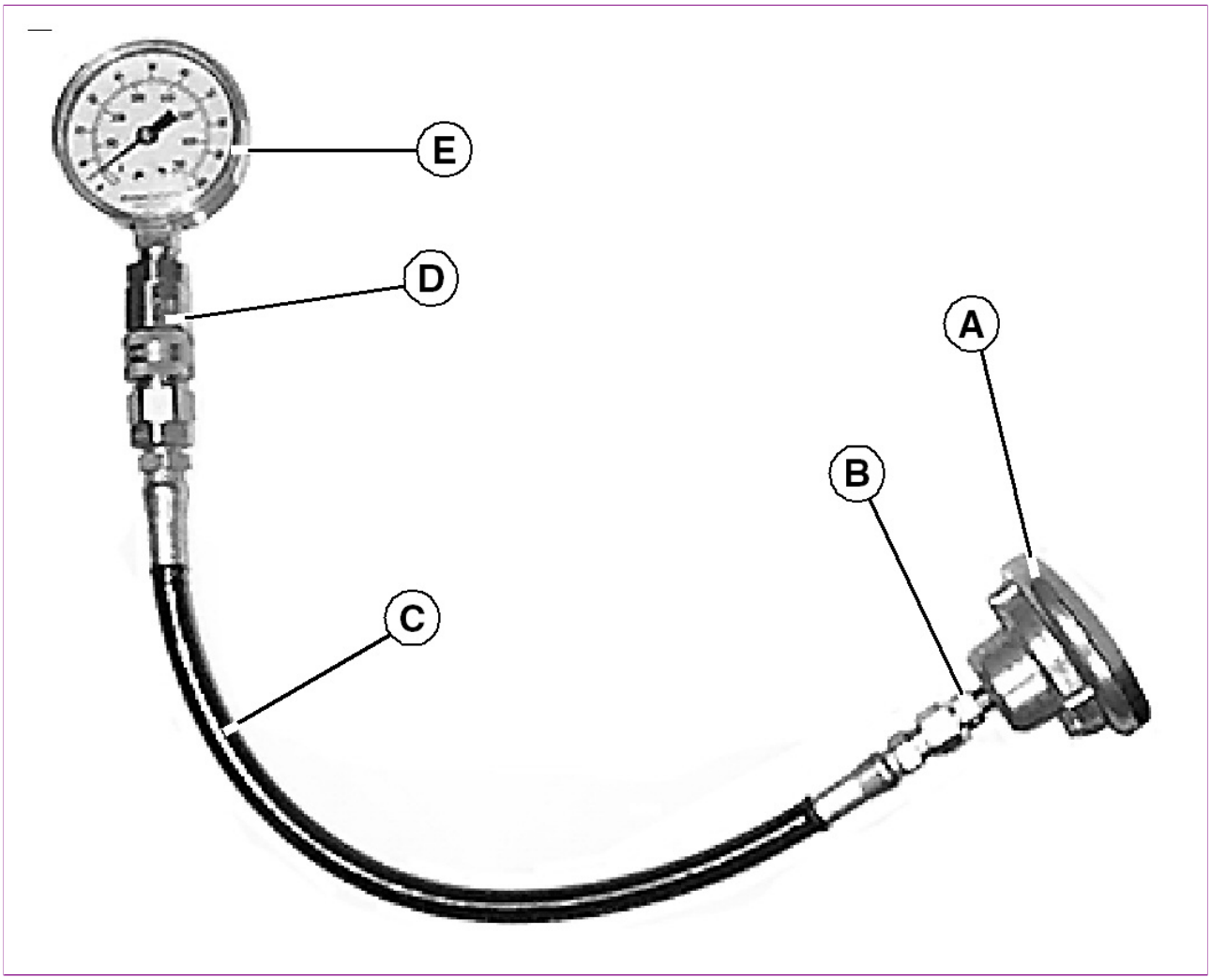
Equipment:

- *NOTE:*

  The connector, hose assembly, coupler, and gauge are found in other SERVICEGARD™ test kits.

JT07262 Oil Pressure Test Adapter w/ O-ring (required ONLY on engines without test ports)
- JT05847 Connector
- JT03017 Hose Assembly
- JT03262 Coupler
- JT07034 Gauge, 0 - 700 kPa (0 - 100 psi)

Test Procedure At Oil Filter Base:

1. Perform test procedure with engine level.
2. Stop engine.
3. Remove hood assembly.
4. Disconnect spark plug wires and allow engine to cool.
5. Drain engine oil from oil filter.
6. Remove oil filter and wipe filter base clean.
7. 

LEGEND:

A - JTO7262 Oil Pressure Adapter
B - JTO5487 Connector
C - JTO3017 Hose Assembly
D - JTO3262 Coupler

E - JTO7034 Gauge

Install pre-assembled adapter, connector, hose assembly, coupler, and gauge on to oil filter base. ONLY hand-tighten adapter to oil filter base.

8. Check crankcase oil level and adjust to full mark.
9. Monitor oil pressure during cranking, if oil pressure is below **28 kPa (4 psi)** - STOP engine immediately and correct cause before continuing.
10. Connect spark plug wires.
11.

CAUTION:

Touching hot surfaces can burn skin. The engine, components, and fluids will be hot if the engine has been running. Keep hands and body away from hot surfaces when servicing or working near the engine and components. Allow engine to cool.

Warm-up engine by running at MEDIUM idle for five minutes.

12. Record oil pressure readings at SLOW and FAST idle.
13. Stop engine and allow to cool.
14. Remove adapter, connector, hose assembly, coupler, and gauge.
15. Install new oil filter.
16. Run engine for 30 seconds and stop engine.
17. Check crankcase oil level and adjust to full mark.

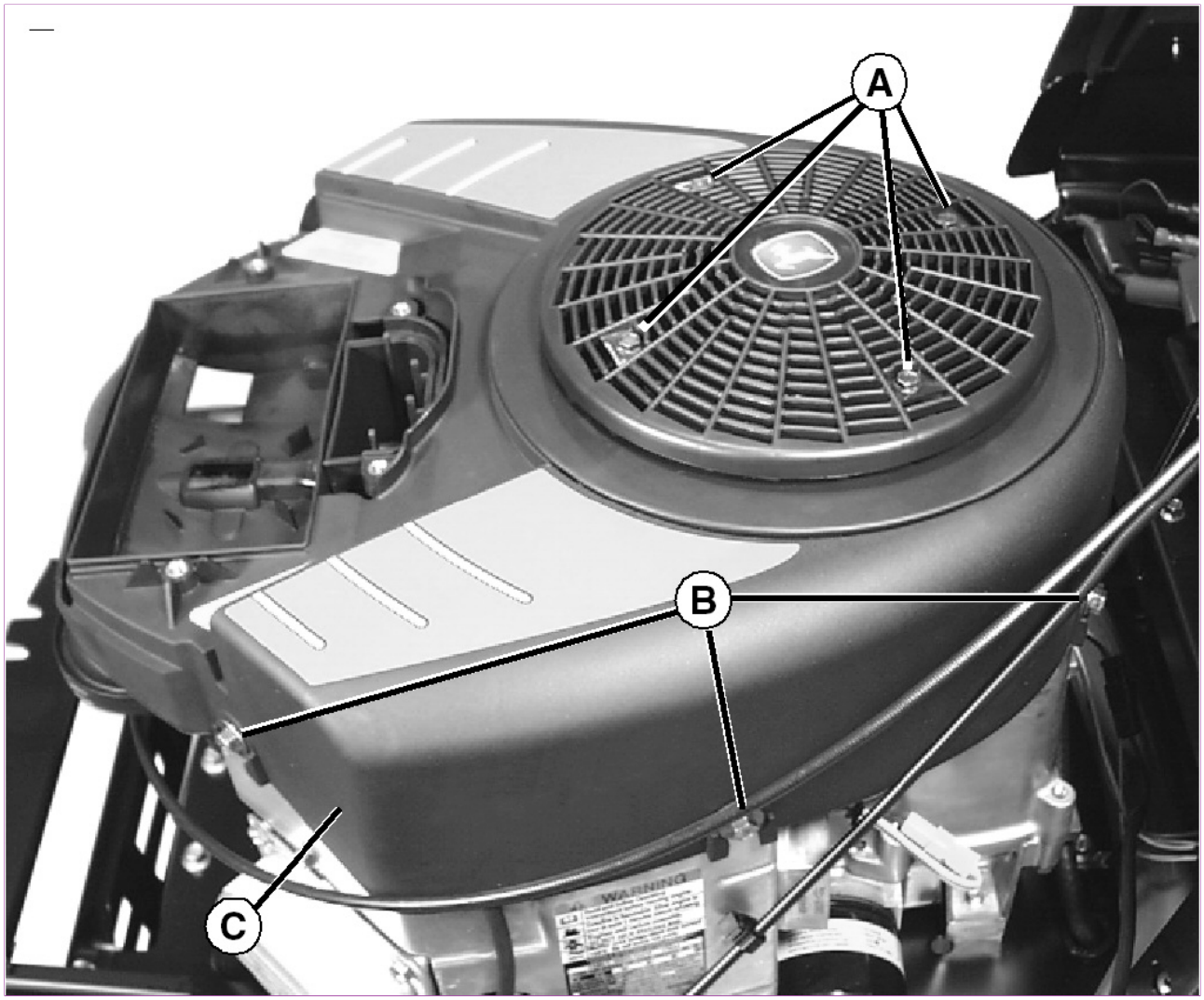
Results:

- If oil pressure readings are not within **103 kPa - 345 kPa (15 - 50 psi)** , inspect and/or replace the following:
  - Oil pump assembly
  - Oil suction screen
  - Oil passages
  - Bearing wear
  - Oil Seals

Upper Blower Housing Removal and Installation

Procedure:

1. Remove air cleaner cover and air cleaner elements.



2. Remove four screws (A) securing the rotating screen to the fan.
3. Remove six screws (B) (three on each side) holding the upper blower housing (C) to the engine block.
4. Remove upper blower housing.
5. **IMPORTANT:**

   Upper blower housing must be assembled so that the slot in the blower housing aligns with the ridge in the air intake. Failure to assemble correctly will prevent the air filter from sealing and cause engine damage.

   Install in reverse order of removal.

Item	Measurement	Specification
Specification:		
Blower Housing Screws		9 N•m 80 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Air Cleaner Removal and Installation

Air Cleaner Removal and Installation

IMPORTANT:

DO NOT use petroleum solvents, such as kerosene, to clean foam pre-cleaner. They may cause foam to deteriorate. DO NOT oil paper cartridge. DO NOT use pressurized air to clean or dry paper cartridge. Replace the paper cartridge if it is dirty.

1. Remove cover assembly.
2. Remove filter cartridge. Clean by tapping gently on a flat surface. Replace if dirty. Remove foam pre-cleaner.
3. Wash pre-cleaner in liquid detergent and water.
4. Squeeze it dry in a clean cloth.
5. Saturate it in clean engine oil. Wrap it in a clean, absorbent cloth. Squeeze to remove excess oil.
6. Installation is the reverse of removal.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Two Barrel Carburetor

Two Barrel Carburetor

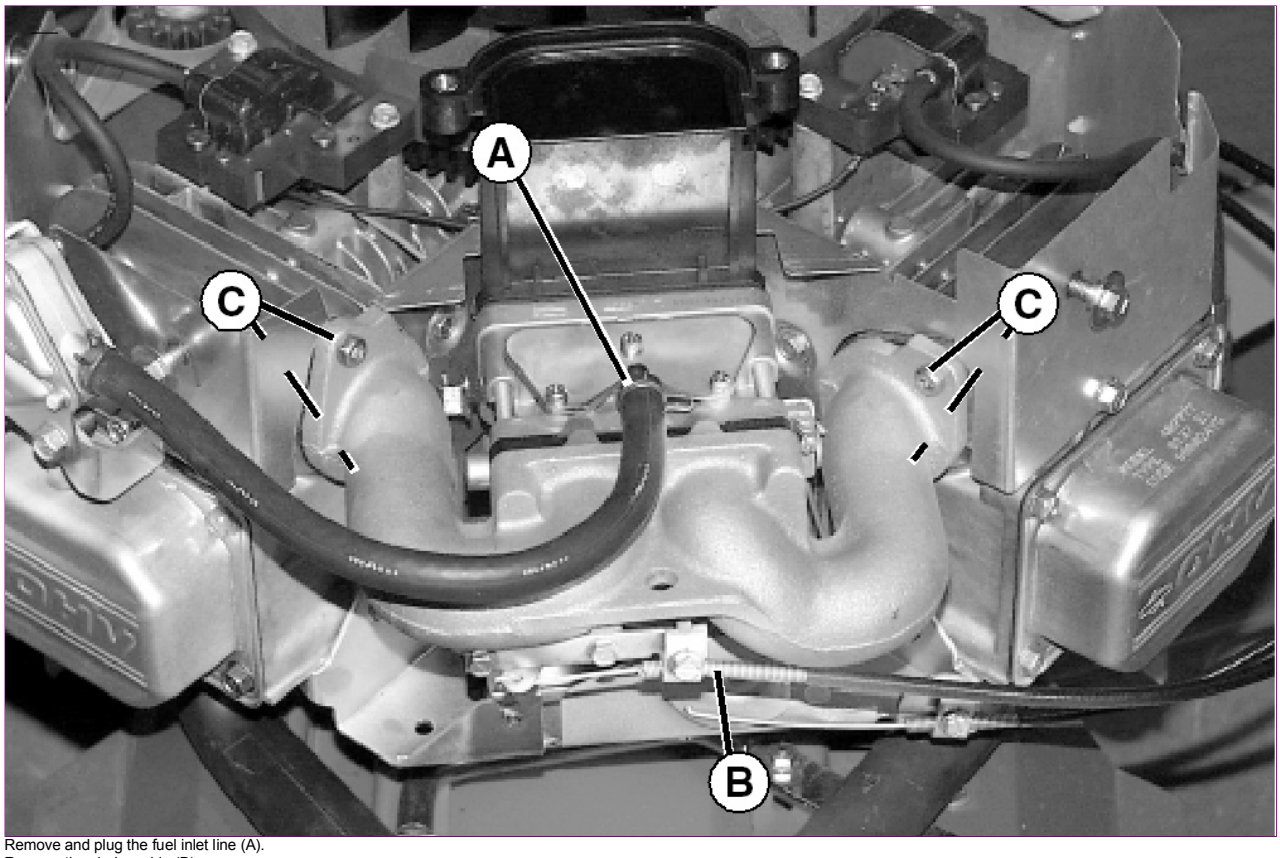
Removal:

1. Remove upper blower housing. See Upper Blower Housing Removal and Installation .
2.

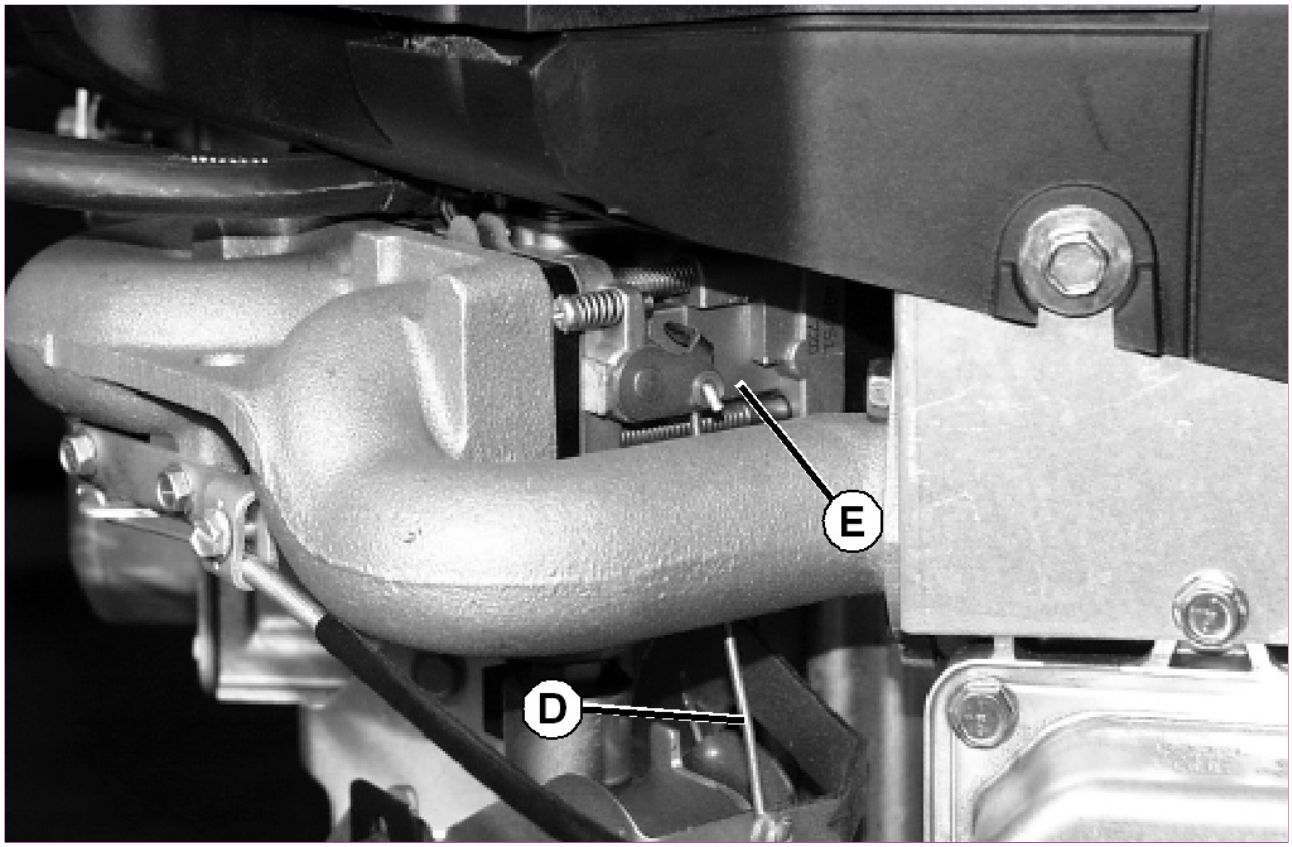
CAUTION:

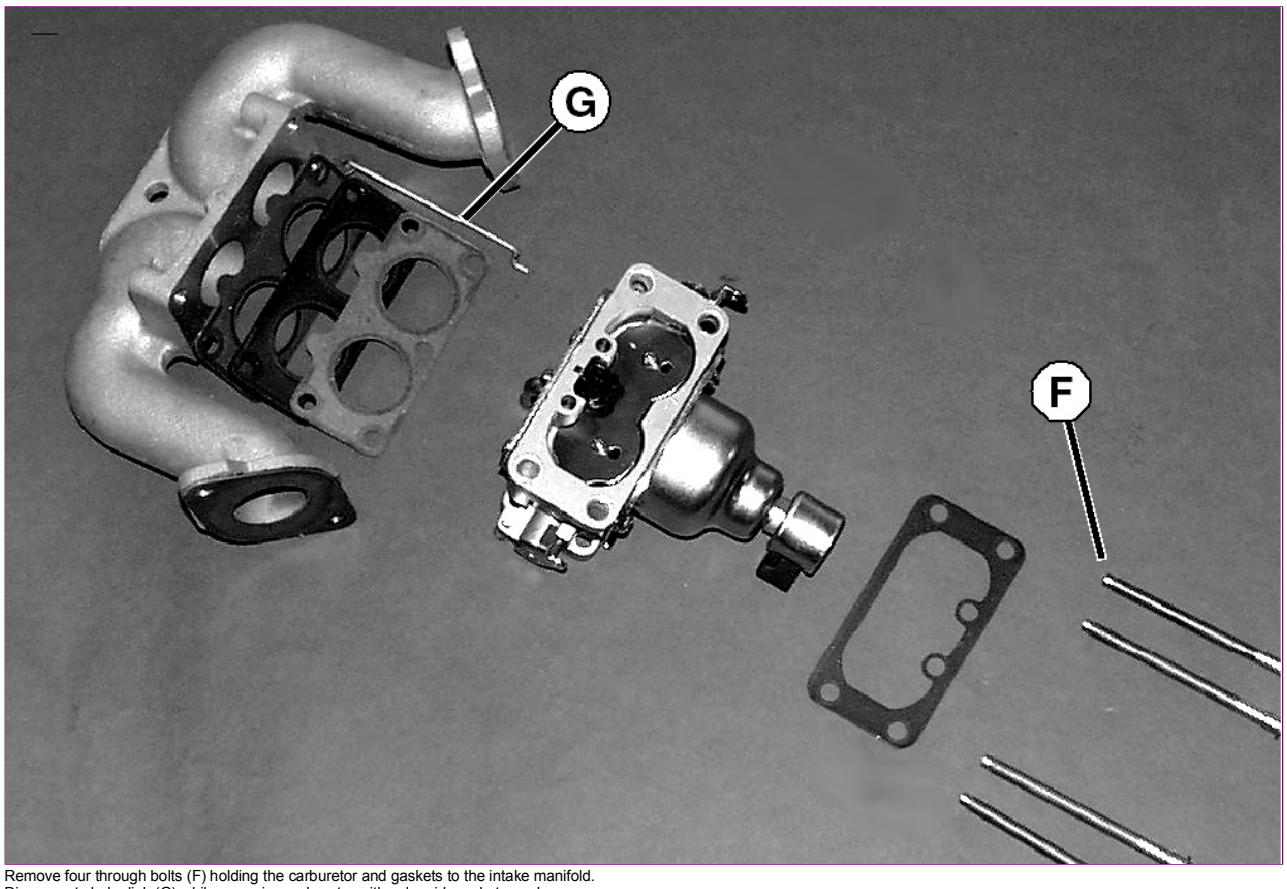
Fuel vapors are explosive and flammable:

- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Shut off engine before servicing.***
- ***Cool engine before servicing.***
- ***Work in a well-ventilated area.***
- ***Clean up spilled fuel immediately.***



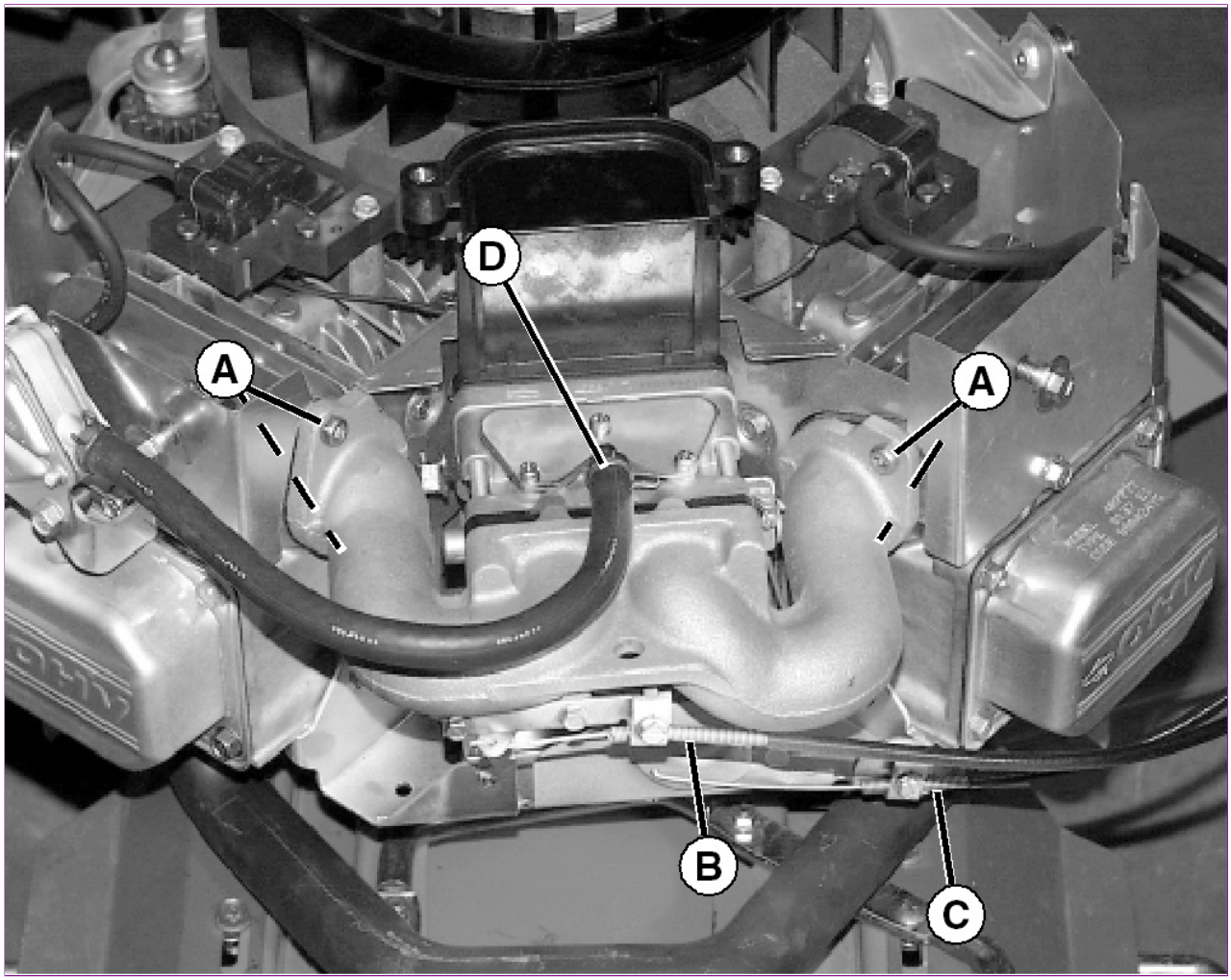
Remove and plug the fuel inlet line (A).
3. Remove the choke cable (B).
4. Remove four cap screws (C) holding the intake manifold to the cylinder block.

5. 

Disconnect the throttle link (D) from the throttle lever (E) while carefully pulling the carburetor and manifold assembly away from the engine.
6. Remove four nuts holding the air cleaner elbow to the carburetor.
7. 

Remove four through bolts (F) holding the carburetor and gaskets to the intake manifold.
8. Disconnect choke link (G) while removing carburetor with solenoid, gaskets, and spacer.

Installation:

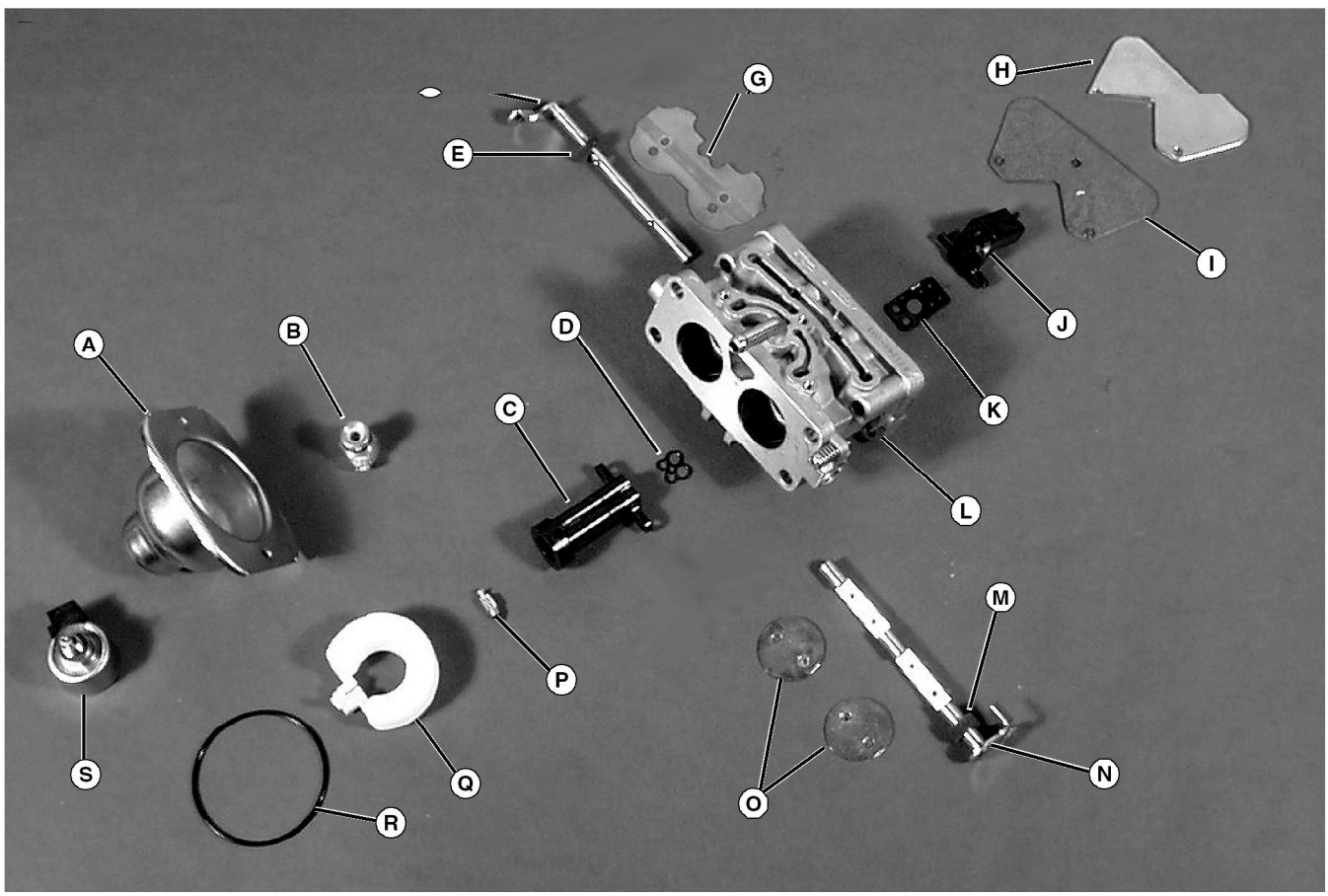
1. Reconnect choke link while assembling spacer, gaskets and carburetor to intake manifold.
2. Secure carburetor to intake using mounting studs. Tighten to **7 N•m (65 lb-in.)** .
3. Install air cleaner elbow. Tighten four nuts to **7 N•m (65 lb-in.)** .
4. Connect throttle link to throttle lever.
5. 

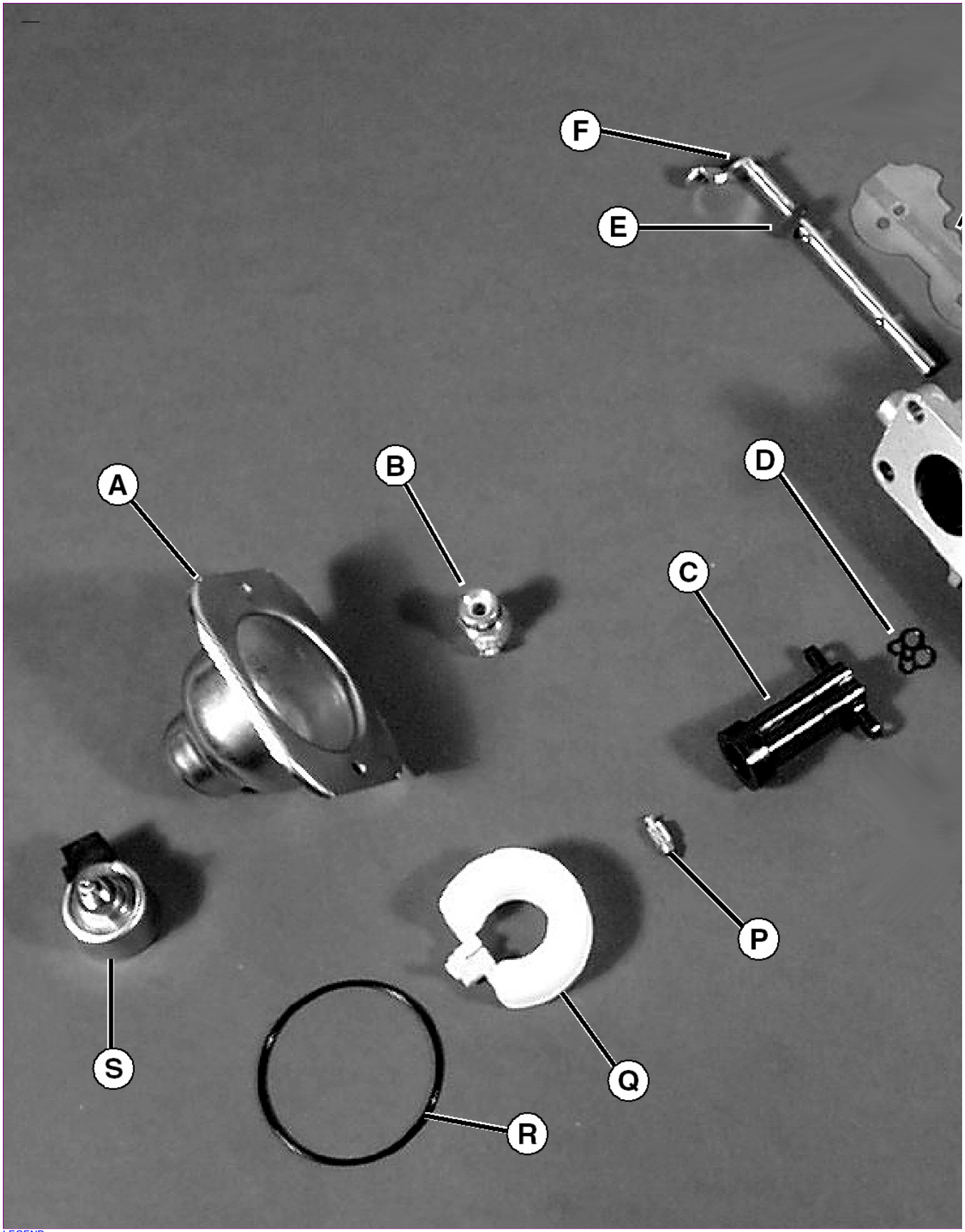
Install intake manifold and carburetor assembly and secure to cylinder block with four cap screws (A). Tighten to **9 N•m (80 lb-in.)** .
6. Reconnect and adjust choke cable (B). See Choke Cable Adjustment .
7. Reconnect and adjust throttle cable (C). See Throttle Cable Adjustment .
8. Reconnect fuel line (D).
9. Install blower housing.

Item	Measurement	Specification
Specifications:		
Carburetor to Intake Manifold		7 N•m 65 lb-in.)
Air Cleaner Elbow to Carburetor		7 N•m 65 lb-in.)
Intake Manifold		9 N•m 80 lb-in.)

Two Barrel Carburetor Repair

Component Location:


A
B
C
D
E
G
H
I
J
K
L
M
N
O
P
Q
R
S



LEGEND:

A - Fuel Bowl
B - Main Jet
C - Emulsion Tube Body

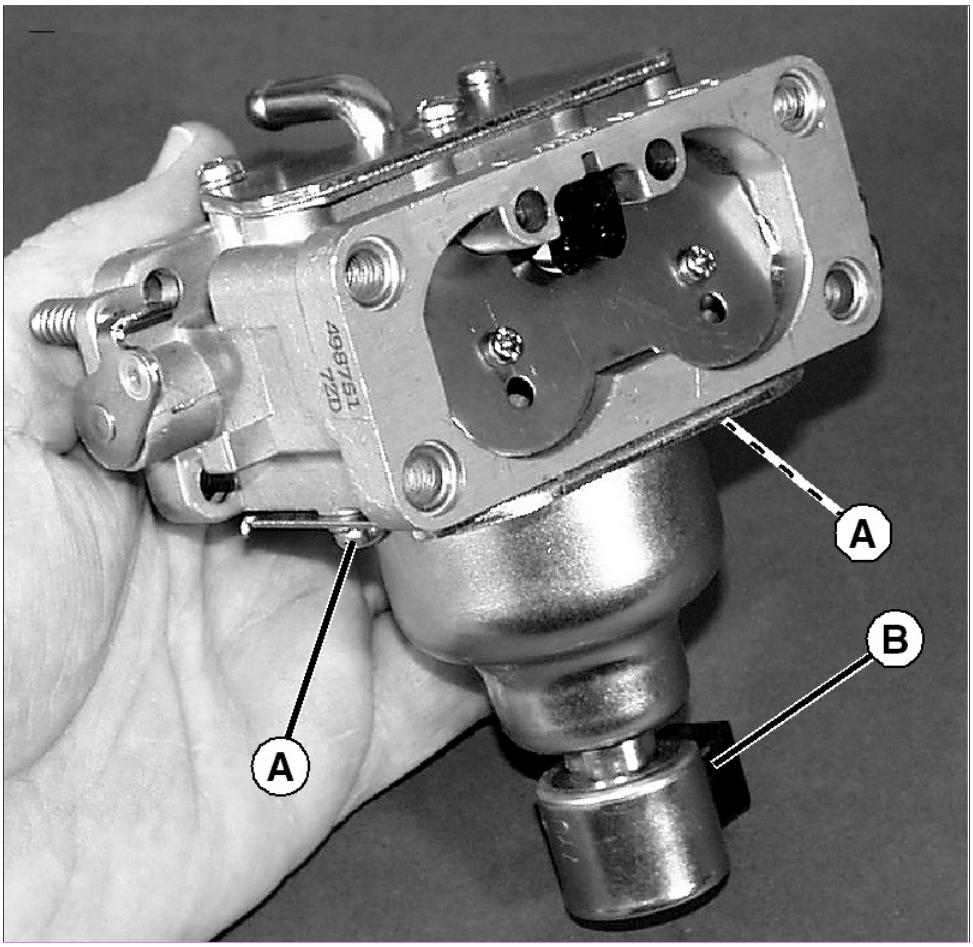
D - Rubber Gasket
E - Foam Seal
F - Choke Shaft
G - Choke Valve
H - Top Plate
I - Top Plate Gasket
J - Discharge Nozzle
K - Rubber Gasket
L - Carburetor Body
M - Foam Seal
N - Throttle Shaft
O - Throttle Valve Plates
P - Inlet Valve
Q - Float
R - O-ring
S - Fuel Shutoff Solenoid

Disassembly:

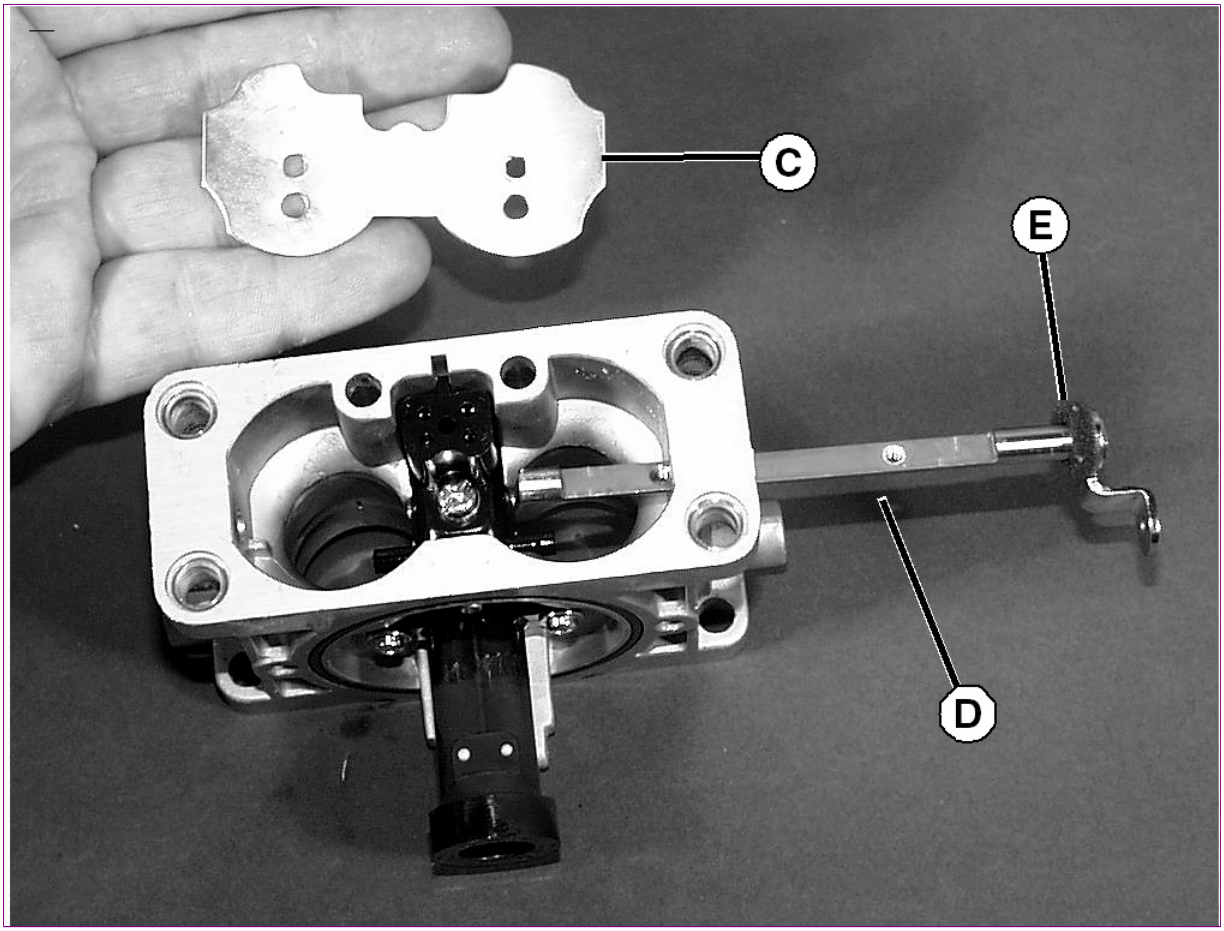
CAUTION:

Fuel vapors are explosive and flammable:

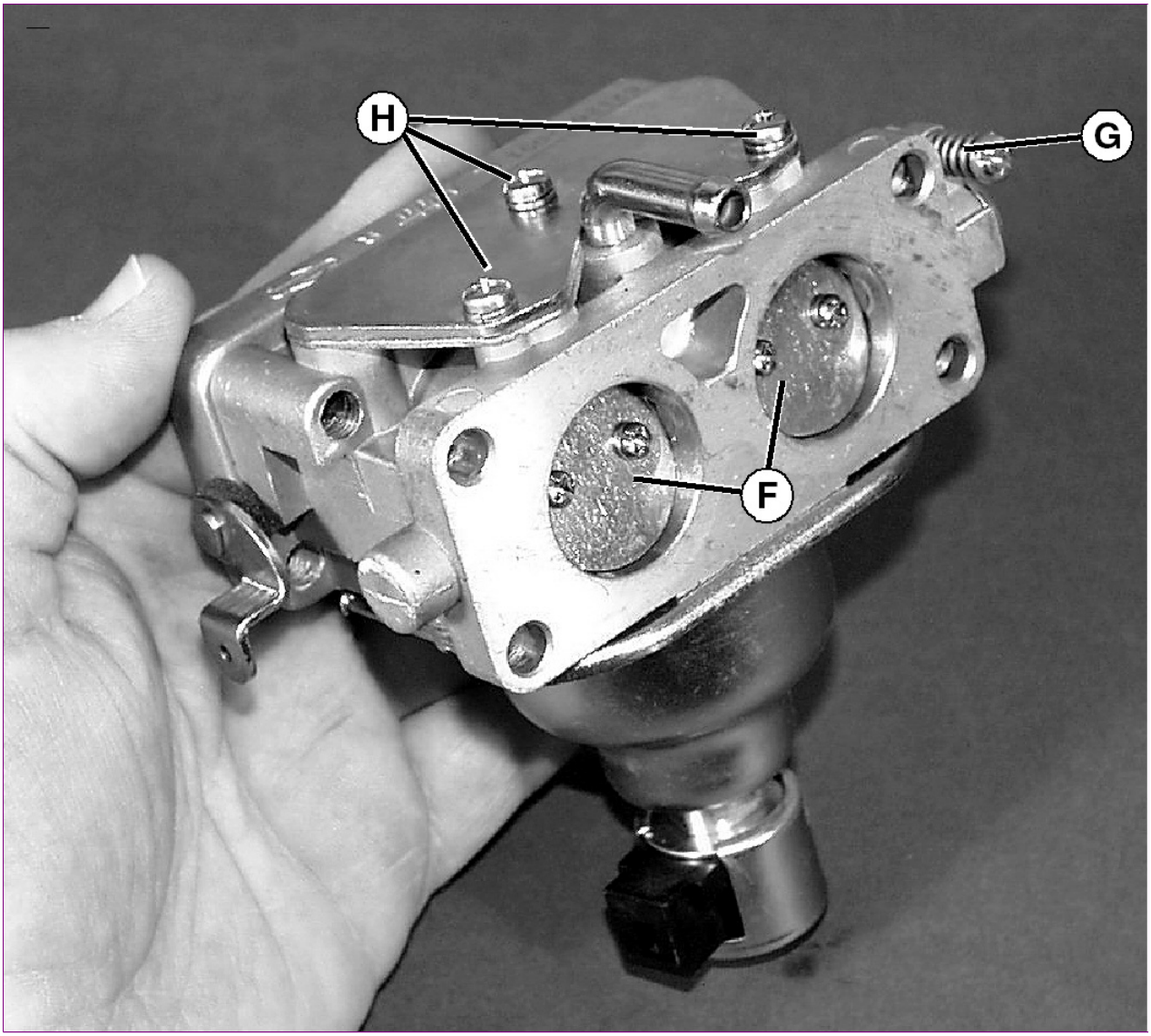
- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Shut off engine before servicing.***
- ***Cool engine before servicing.***
- ***Work in a well-ventilated area.***
- ***Clean up spilled fuel immediately.***



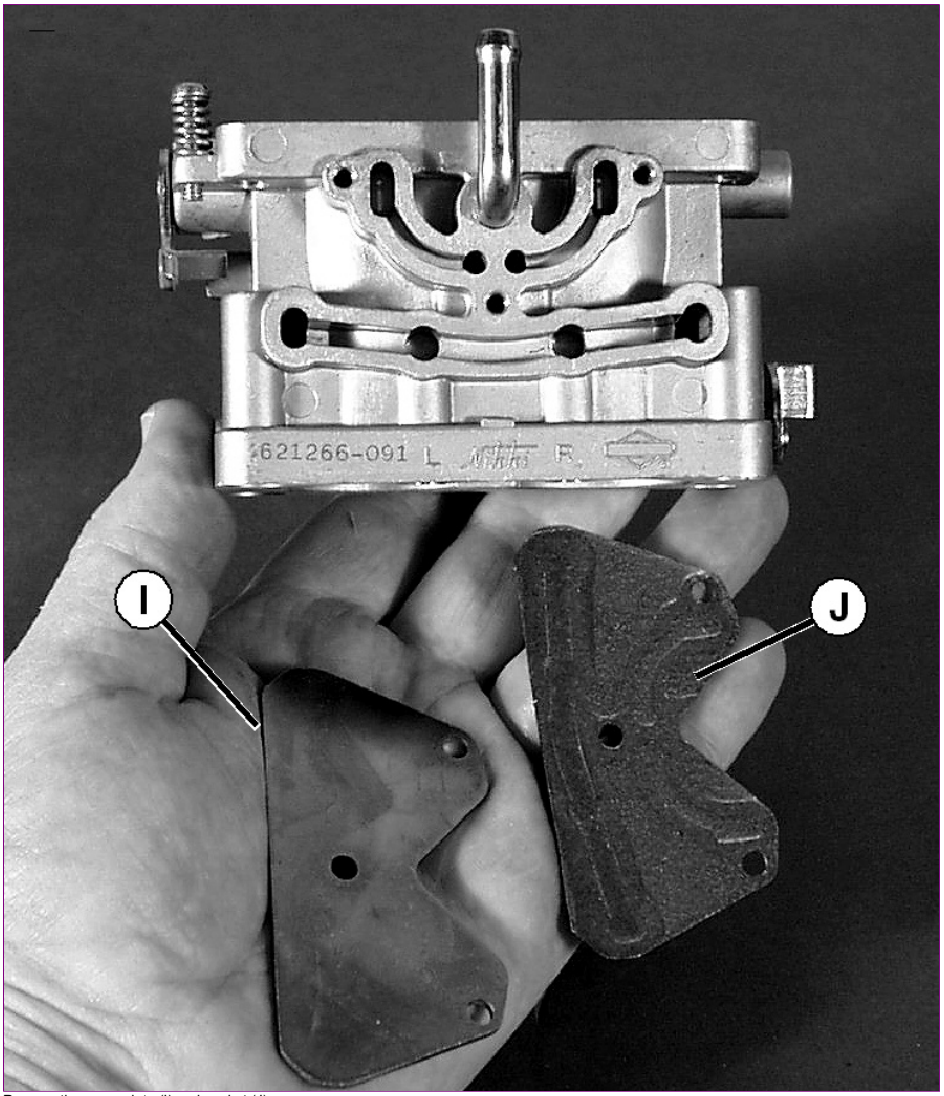
1. Remove two screws (A) holding the fuel bowl to the carburetor body. Remove fuel bowl and drain the remaining gasoline into a suitable container.
2. Remove fuel shutoff solenoid (B) with washer.
3. Mark choke valve so it can be installed in its original position.

4. 

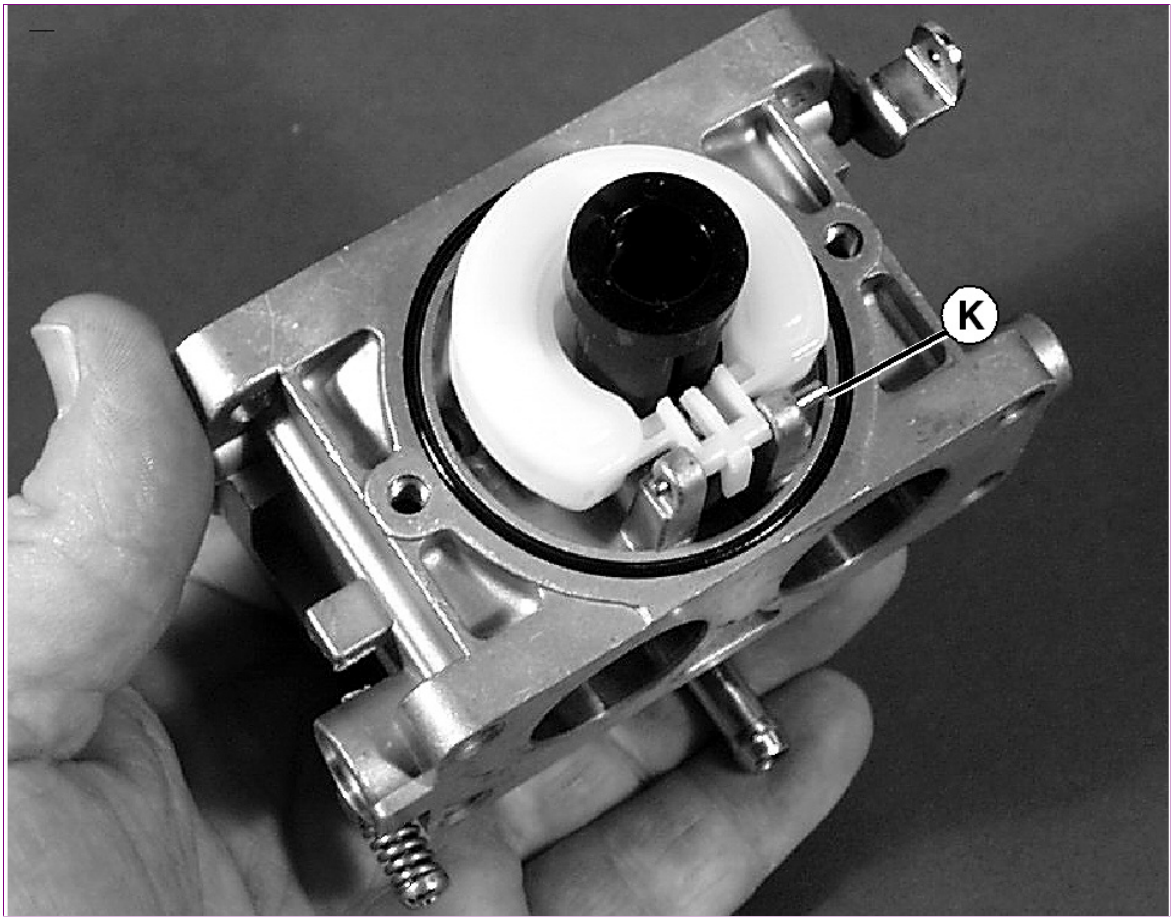
Remove two screws securing the choke valve (C) to the choke shaft (D). Pull choke shaft and foam seal (E) out of carburetor body.
5. Mark the throttle valves so they can be installed in their original position.



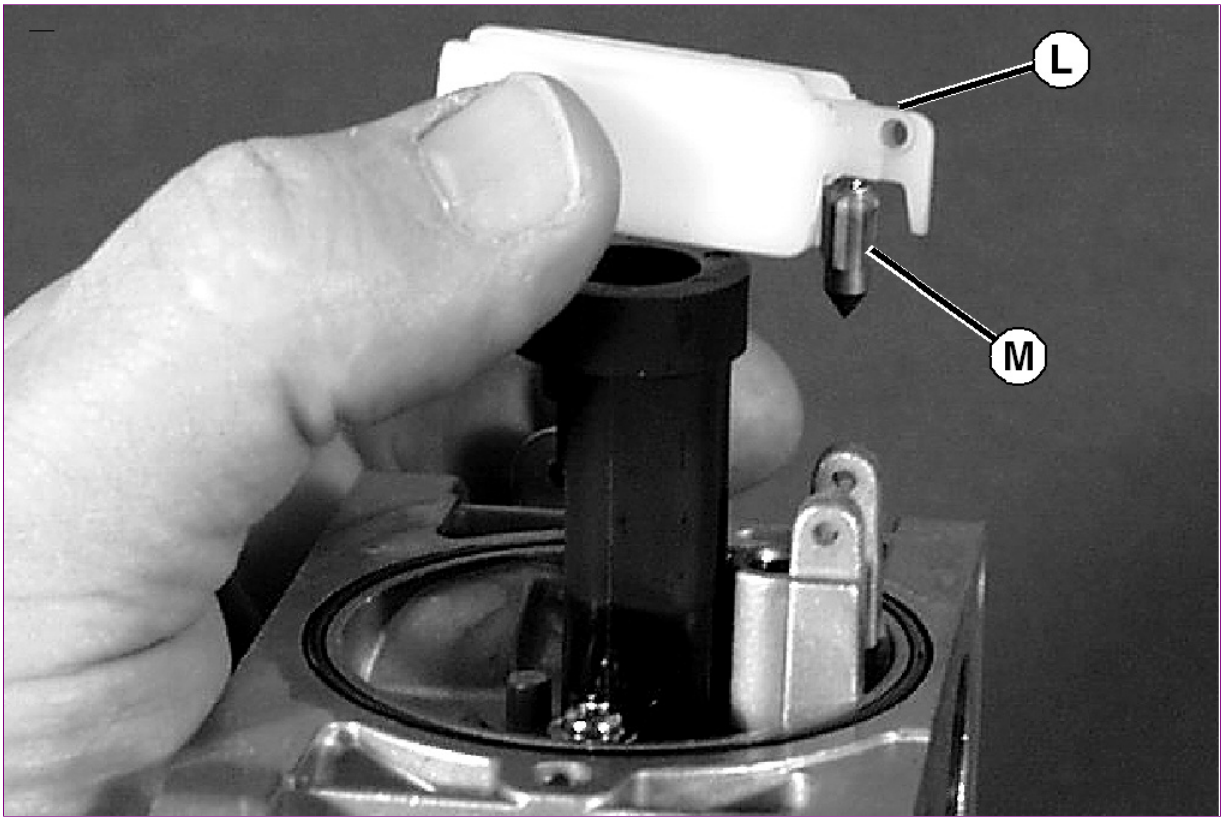
6. Remove four screws securing the throttle valves (F) to the throttle shaft (G). Pull throttle shaft and foam seal out of carburetor body.
7. Remove three screws (H) securing the cover plate and gasket to the carburetor body.



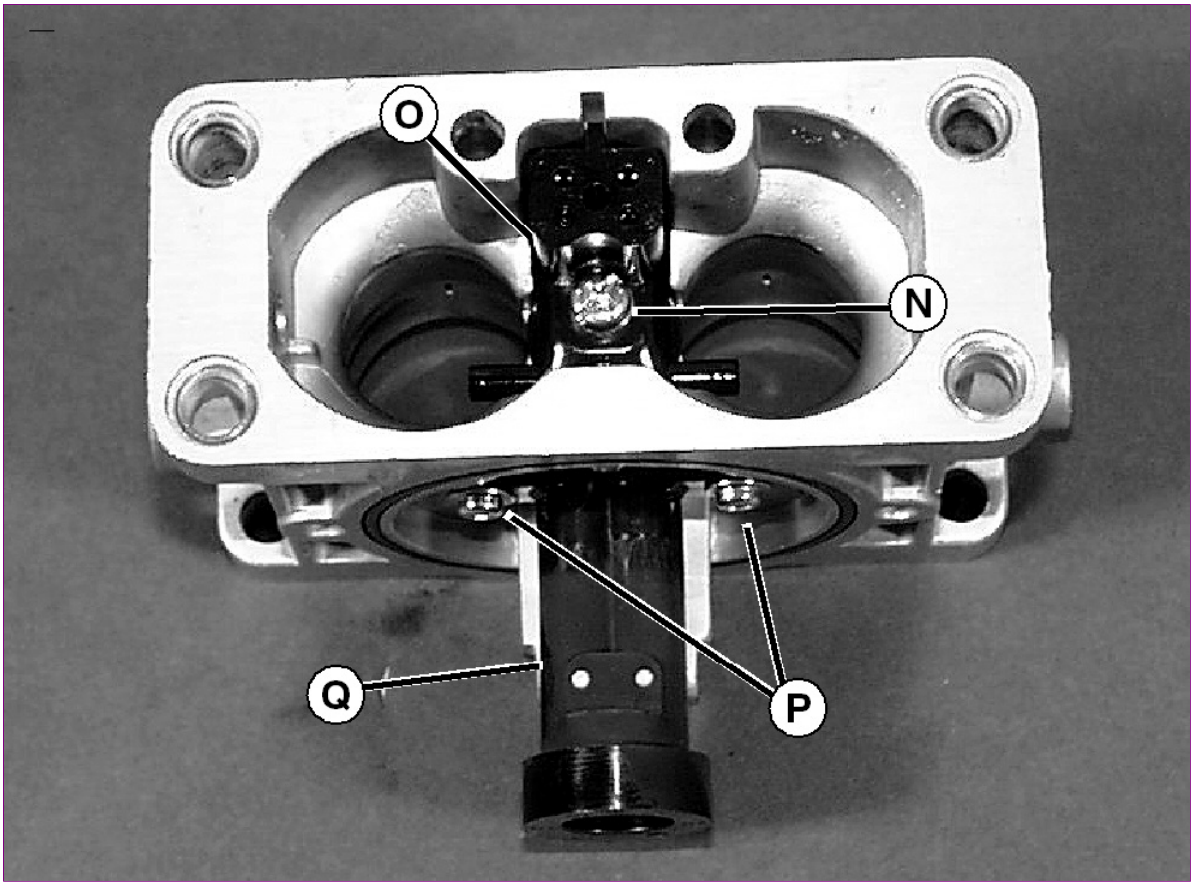
8. Remove the cover plate (I) and gasket (J).

9. 

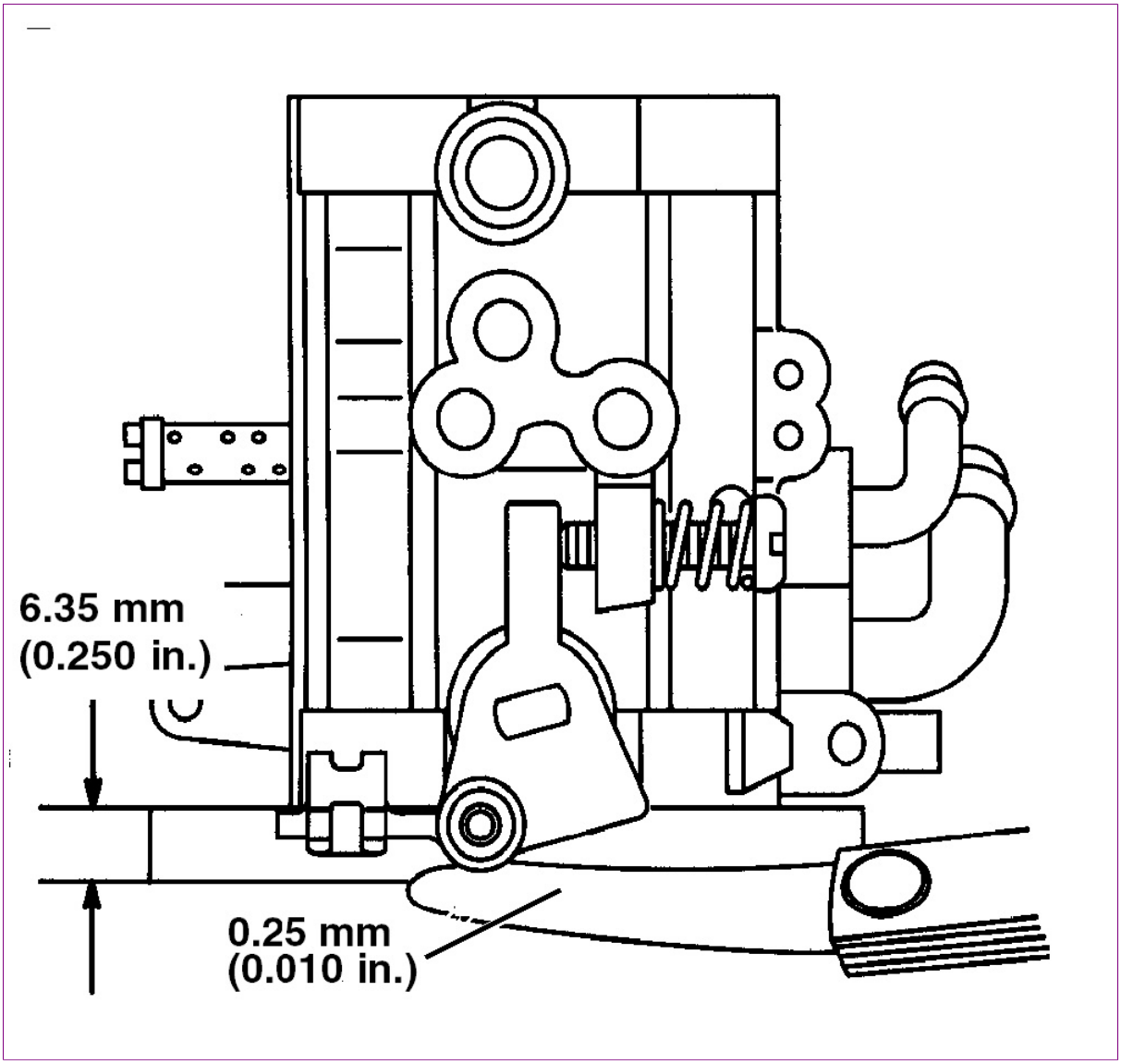
With a small punch, push out float hinge pin (K).

10. 

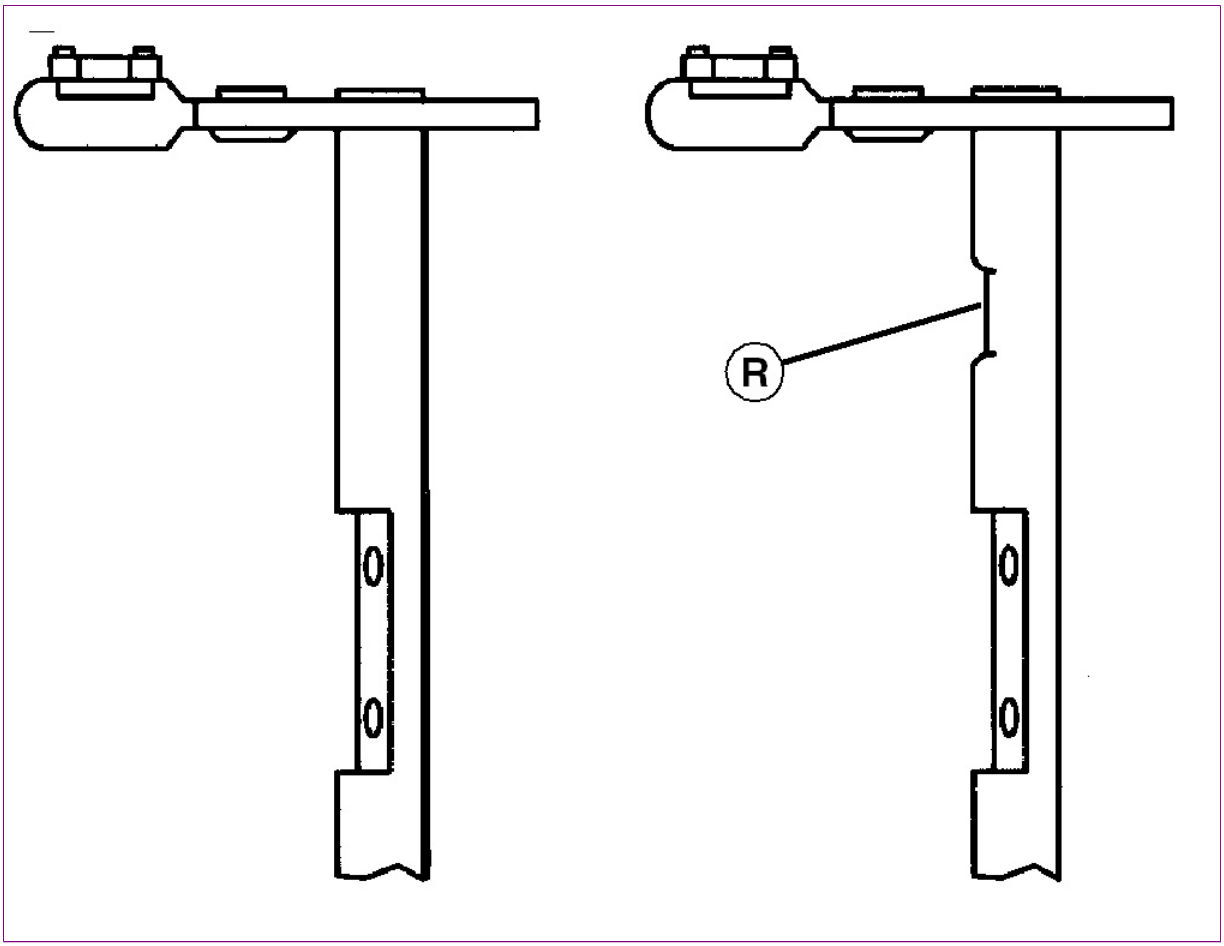
Remove float (L) and fuel inlet valve (M) as an assembly.

11. 

Remove the screw (N) holding the discharge nozzle (O) into the carburetor body.
12. Remove the discharge nozzle and the rubber gasket.
13. Remove two screws (P) and emulsion tube body (Q).
14. Clean metal parts with carburetor cleaner.
15. Inspect moving parts for wear, nicks, and burrs. Inspect float for leaks or damage. Inspect mating surfaces for nicks, burrs, foreign material, and cracks. Replace parts that are worn or damaged.



16. Place carburetor on **6.35 mm (0.250 in.)** raised flat surface. Check throttle and choke shafts and bushings for wear. Wear between shafts and carburetor bushings should not exceed **0.25 mm (0.010 in.)** .
17. Measure the movement of the shaft with a feeler gauge or dial indicator while moving the shaft up and down.

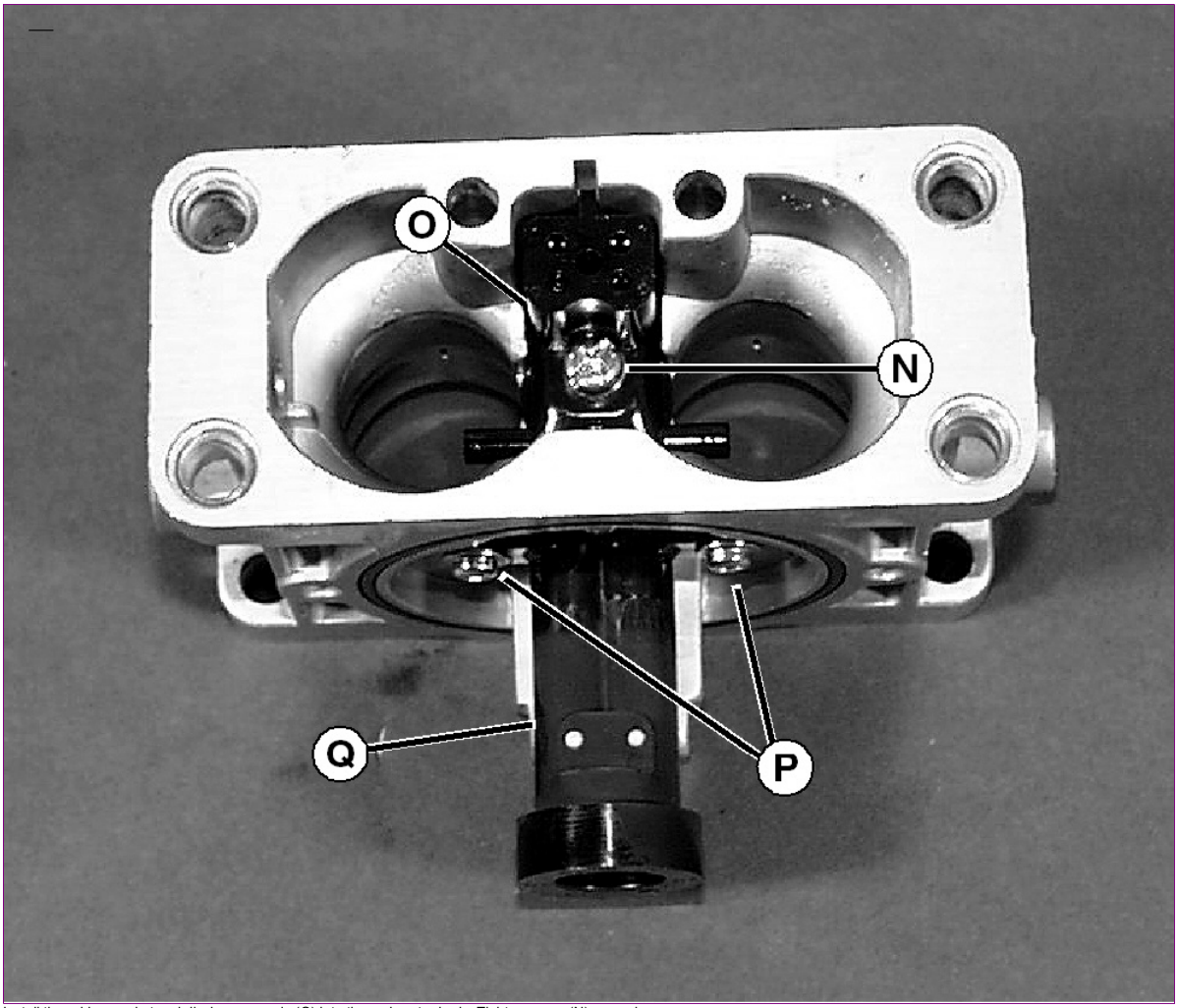


If movement exceeds **0.25 mm (0.010 in.)** check shaft and bushings for wear (R). If shaft is worn, replace shaft. If bushings are worn, replace carburetor.

Assembly:

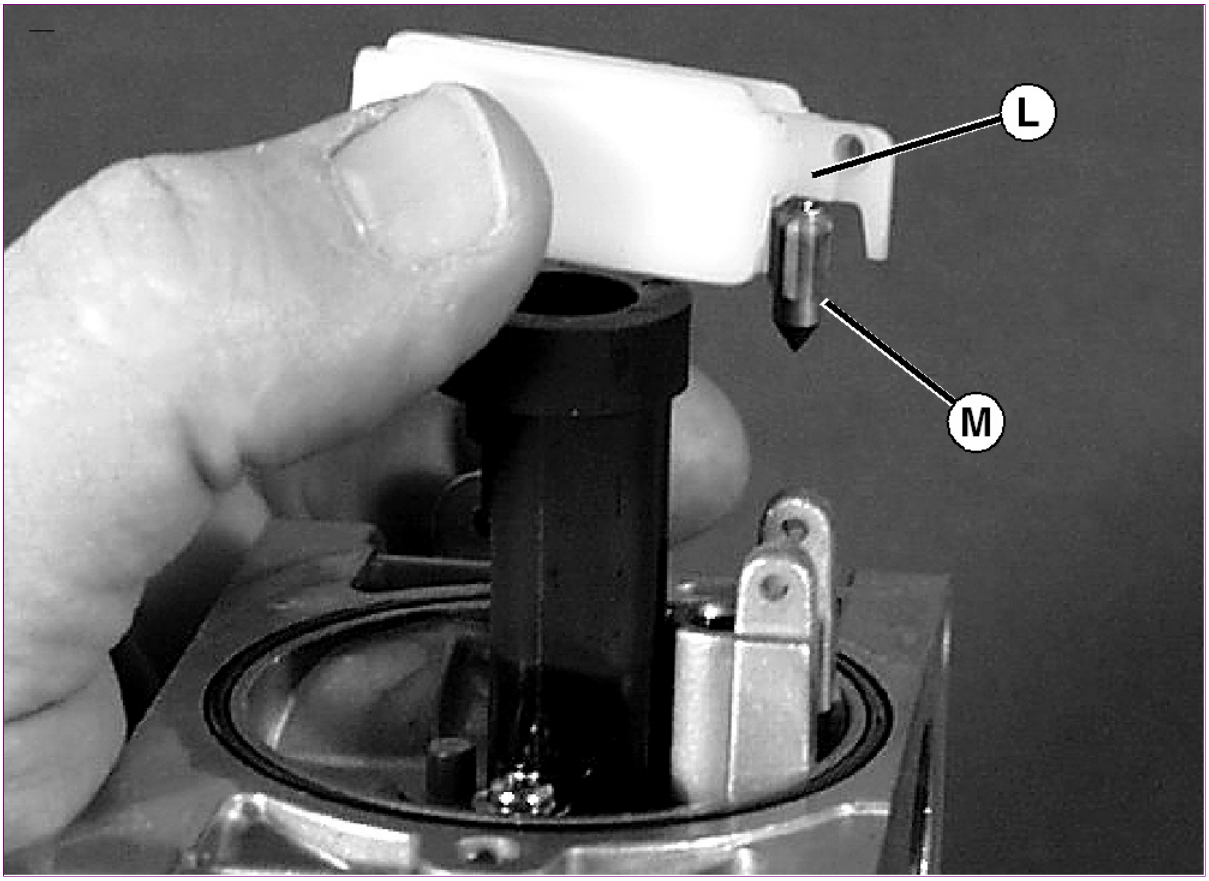
1. *NOTE:*

   Use new seals and gaskets when assembling carburetor.

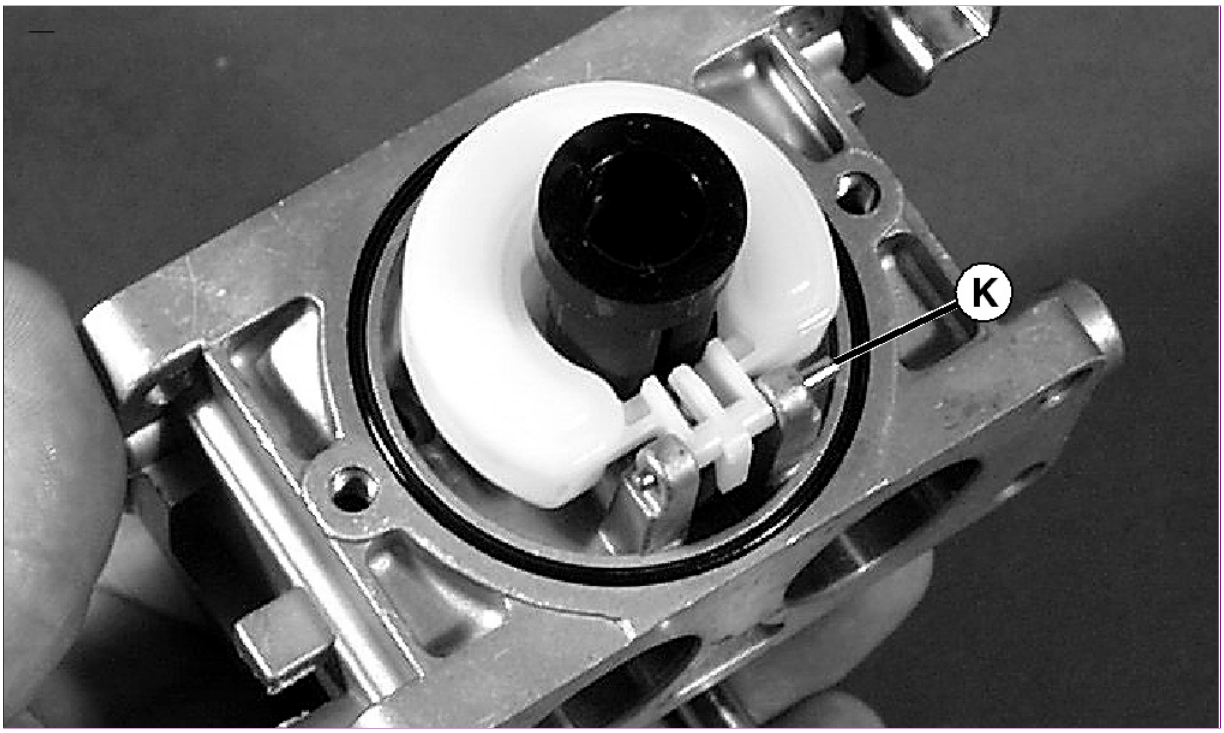


Install the rubber gasket and discharge nozzle (O) into the carburetor body. Tighten screw (N) securely.

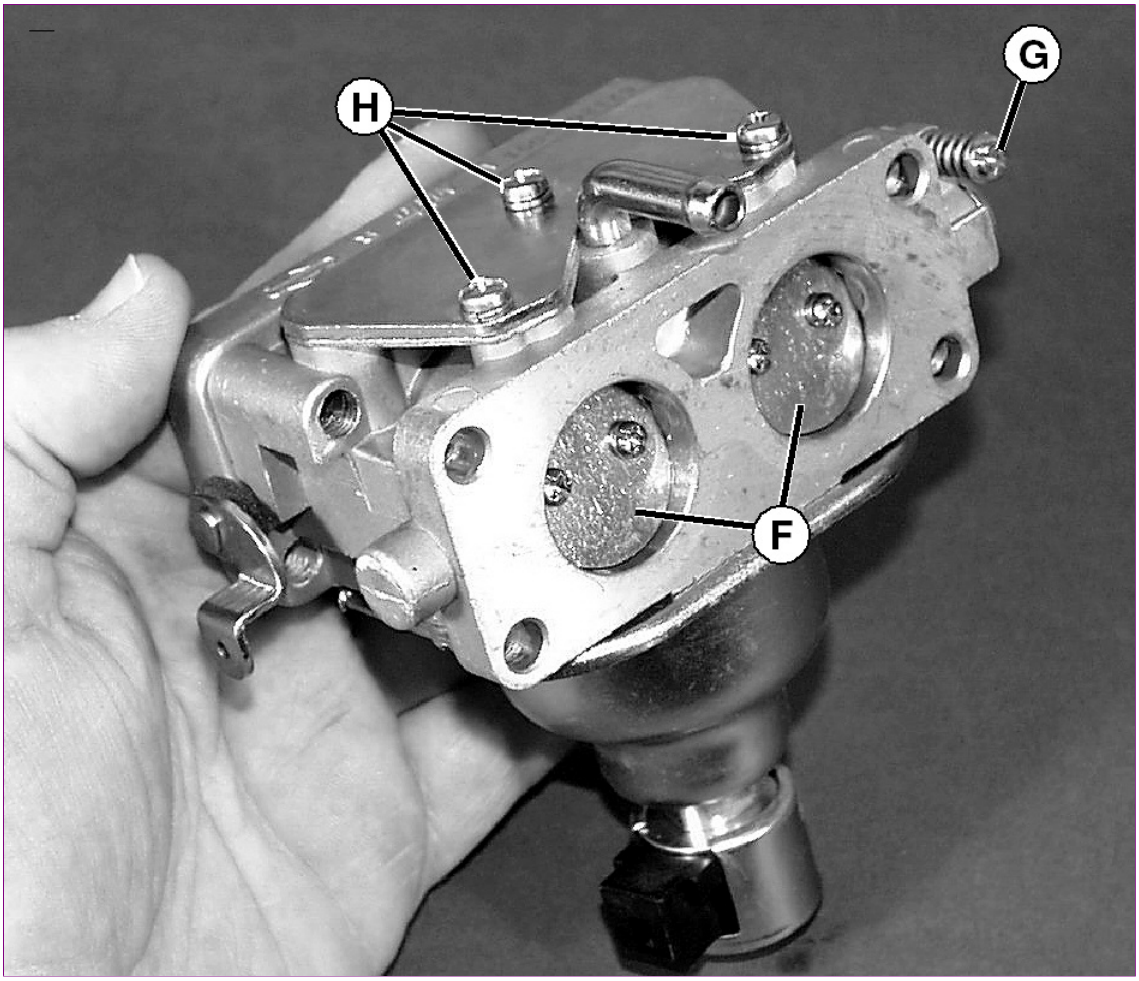
2. Install the rubber gasket and emulsion tube body (Q) to the carburetor body. Tighten securely with two screws (P).

3. 

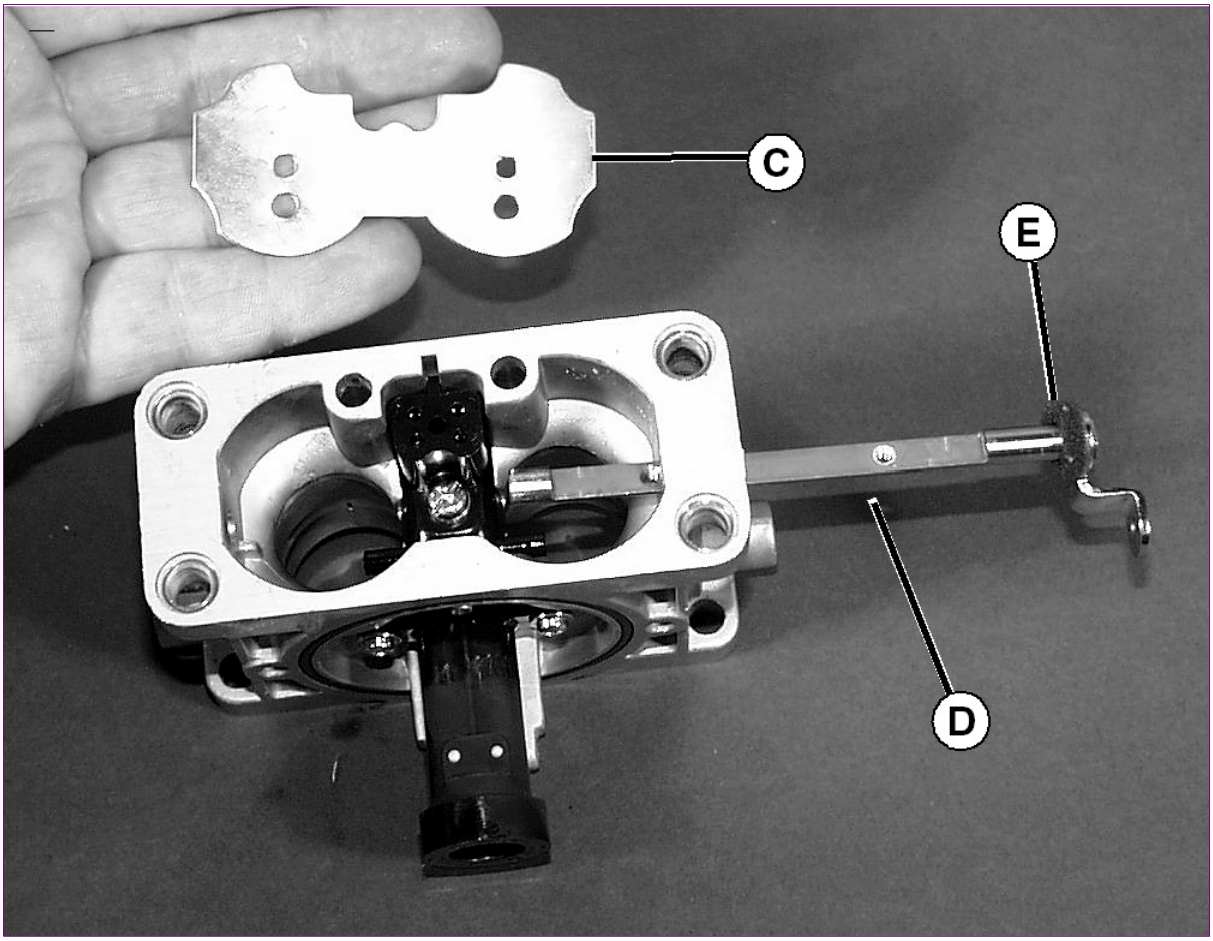
Hook the fuel inlet valve (M) into the float tang (L). Slip float over emulsion tube body aligning fuel inlet valve into seat.

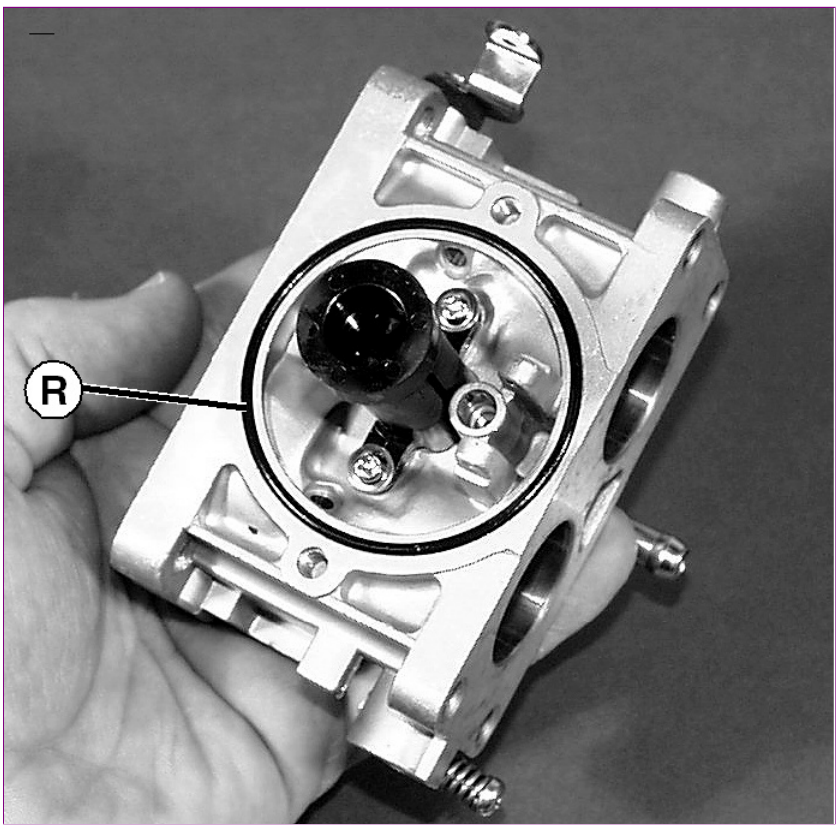
4. 

Push float hinge pin (K) into place. Center pin so that it does not interfere with fuel bowl.

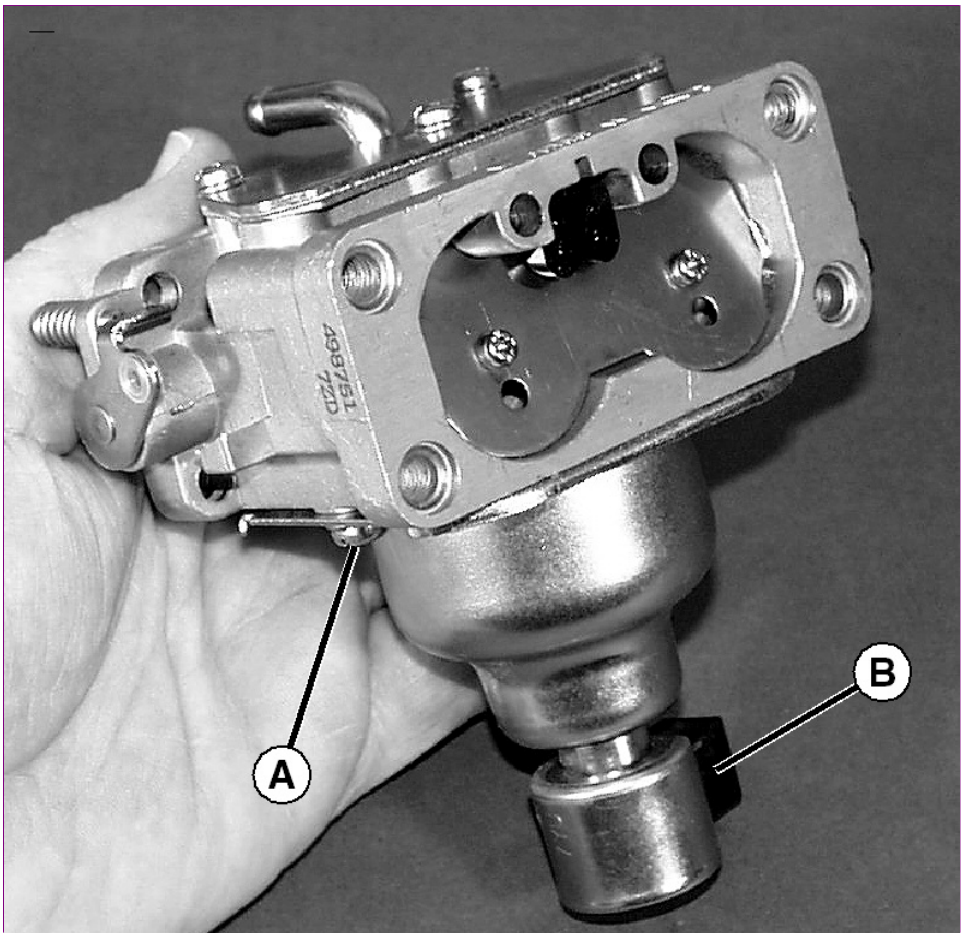


5. Slide foam seal onto throttle shaft. Slide shaft (G) into carburetor body.
6. Using the marks from disassembly, install throttle valves (F) in their original positions. Tighten screws securely.
7. Place the cover gasket and cover plate on the carburetor body. Tighten securely with three screws (H).

8. 

Slide foam seal (E) onto choke shaft. Slide shaft (D) into carburetor body.
9. Using marks from disassembly, install the choke valve (C) in its original position. Tighten screws securely.
10. 

Install O-ring (R) in groove on bottom of carburetor body.



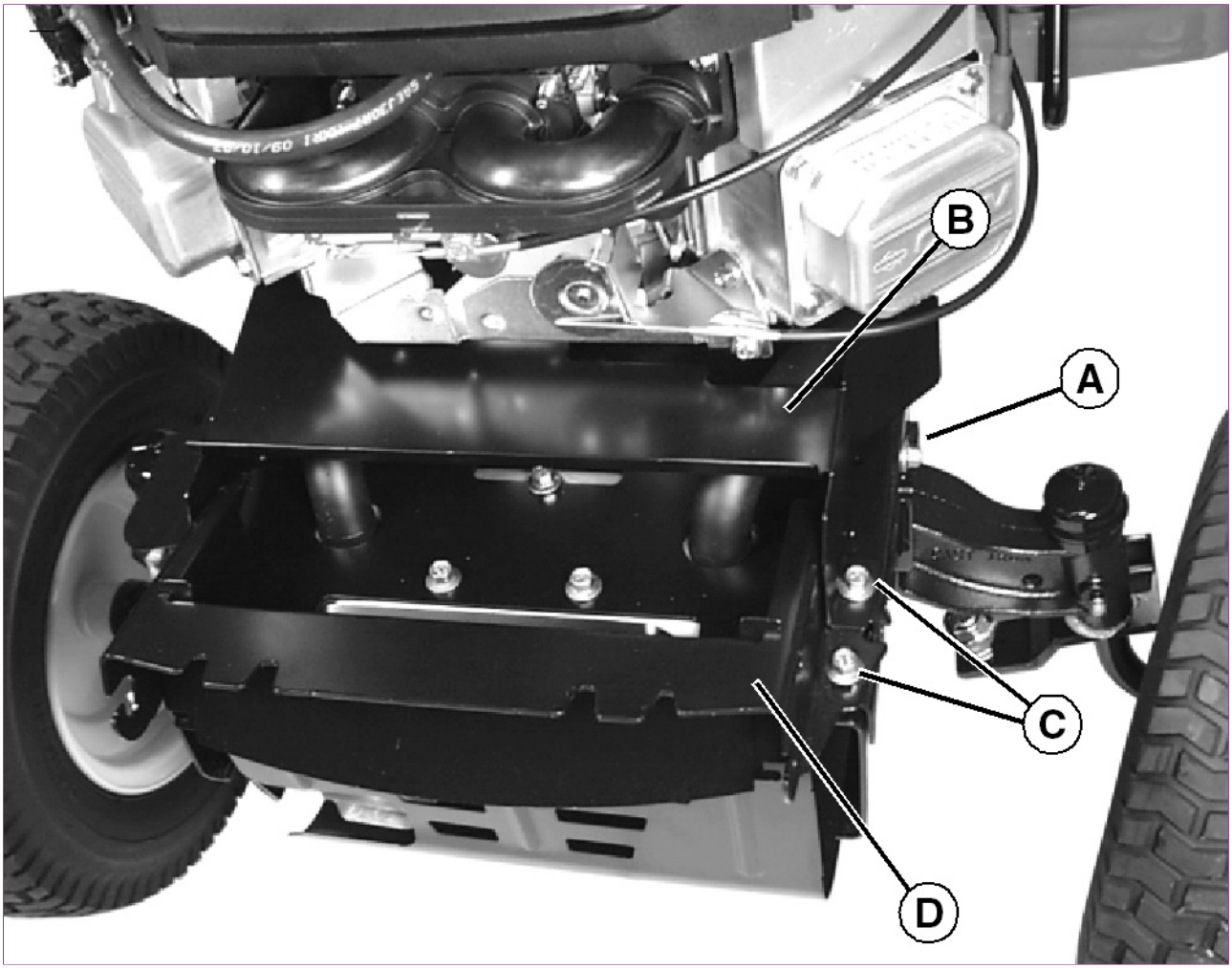
11. Place fuel bowl over the emulsion tube body. Tighten screws (A) securely.
12. Install fuel shutoff solenoid (B) with washer. Tighten to **5 N•m (45 lb-in.)** .

Item	Measurement	Specification
Specification:		
Fuel Shutoff Solenoid		5 N•m 45 lb-in.)

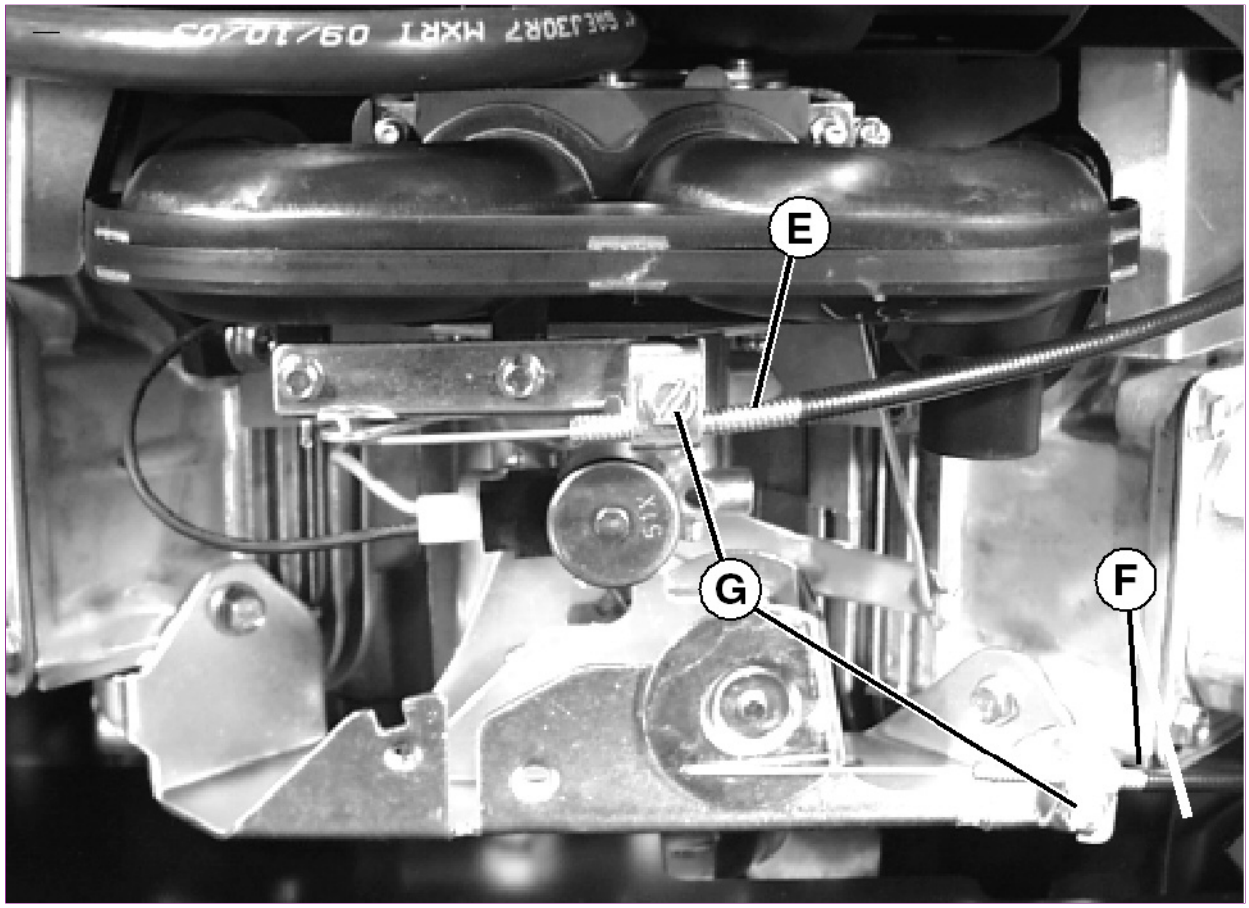
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Engine Removal

Engine Removal

Procedure:

1. Turn switches OFF. Disconnect negative (-) battery cable.
2. Remove mower deck.
3. Raise hood. Disconnect light harness on right side of hood. Lower hood to approximately 3/4 open and slide off bracket.
4. Drain engine oil into a suitable container. (Oil capacity with filter is **1.9 L (2.0 US qt).**
5. 

Remove two top cap screws (C) and two side cap screws (A). Remove both the top (B) and bottom (D) heat shields.

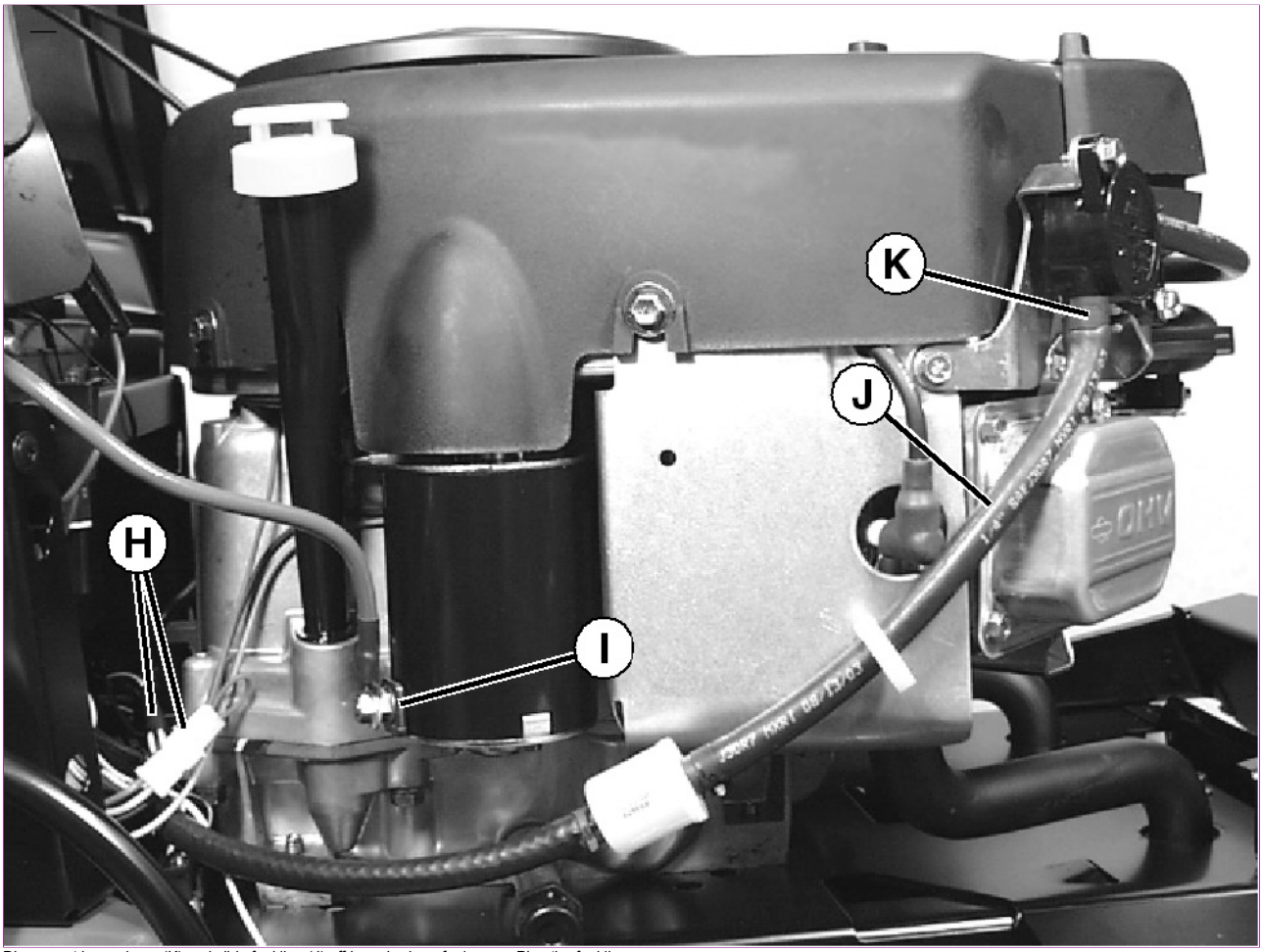
6. 

Loosen retaining clamps (G) for the throttle (F) and choke (E) cables. Disconnect both cables.
7.

CAUTION:

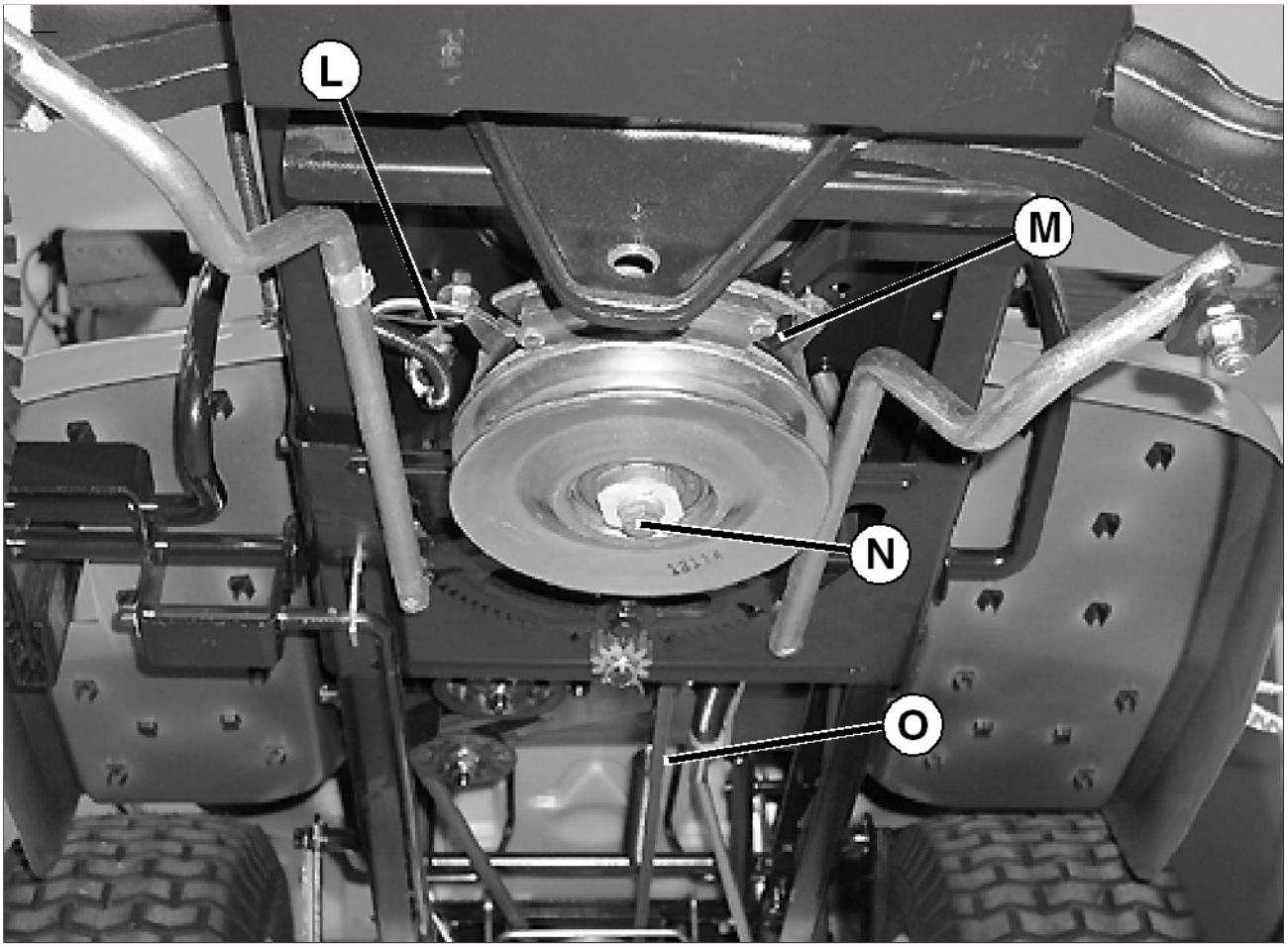
Fuel vapors are explosive and flammable:

- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Shut off engine before servicing.***
- ***Cool engine before servicing.***
- ***Work in a well-ventilated area.***
- ***Clean up spilled fuel immediately.***



Disconnect hose clamp (K) and slide fuel line (J) off hose barb on fuel pump. Plug the fuel line.

8. Disconnect wires from starter terminal (I).
9. Unplug connectors (H) from stator and fuel shutoff solenoid.
10. Remove muffler by removing four cap screws securing muffler to engine and three cap screws securing muffler to frame.

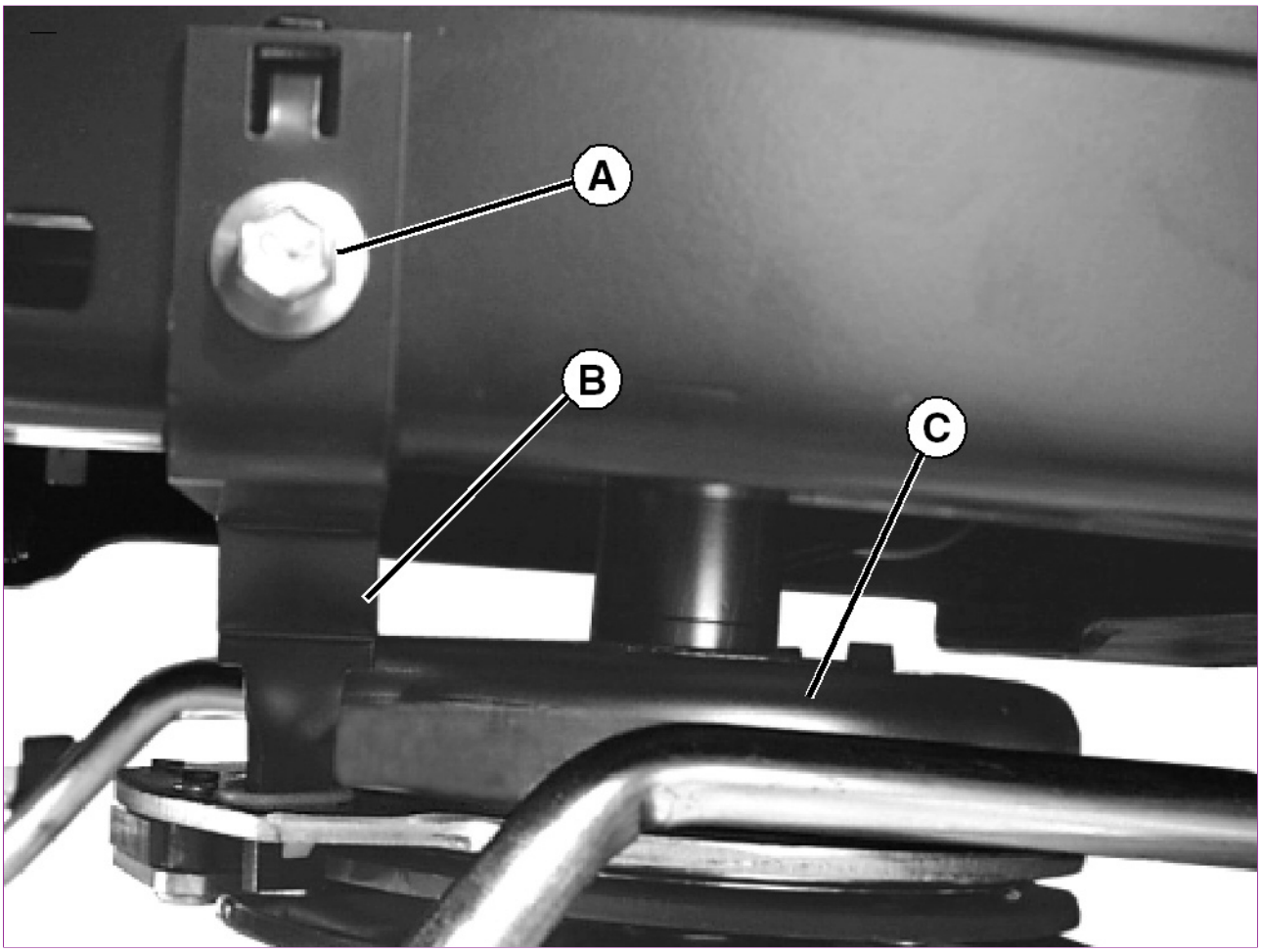


11. Disconnect wiring harness (L) connected to electric PTO clutch (M).
12. With parking brake locked, remove tension from traction drive belt, remove cap screw (N) and lock washer securing electric clutch and engine sheave assemblies to engine output shaft. Remove electric clutch (M) and engine sheave assemblies, simultaneously removing drive belt (O) from around engine sheave.
13. Remove four cap screws securing engine to frame.
14. Remove engine.

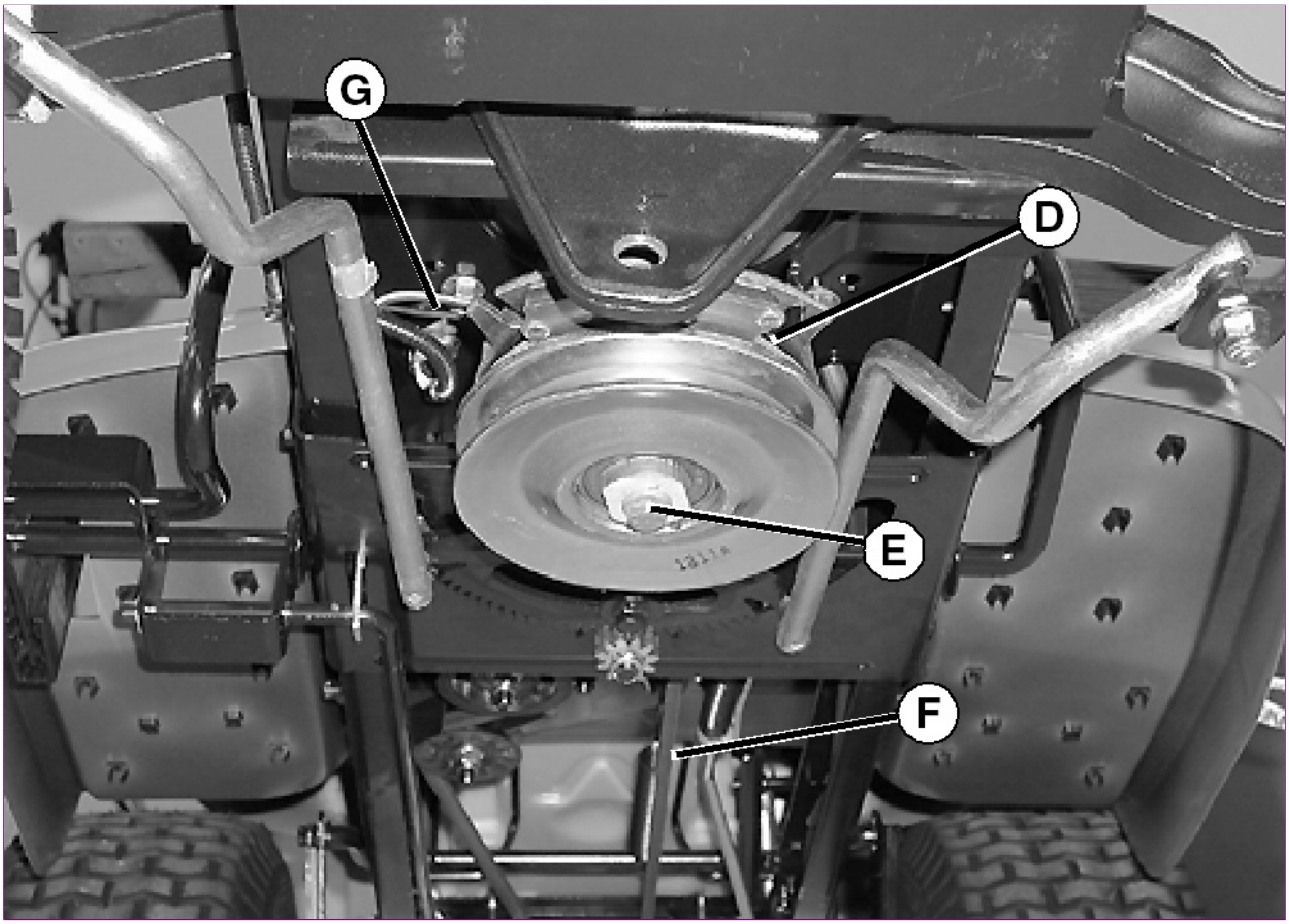
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Engine Installation

Engine Installation

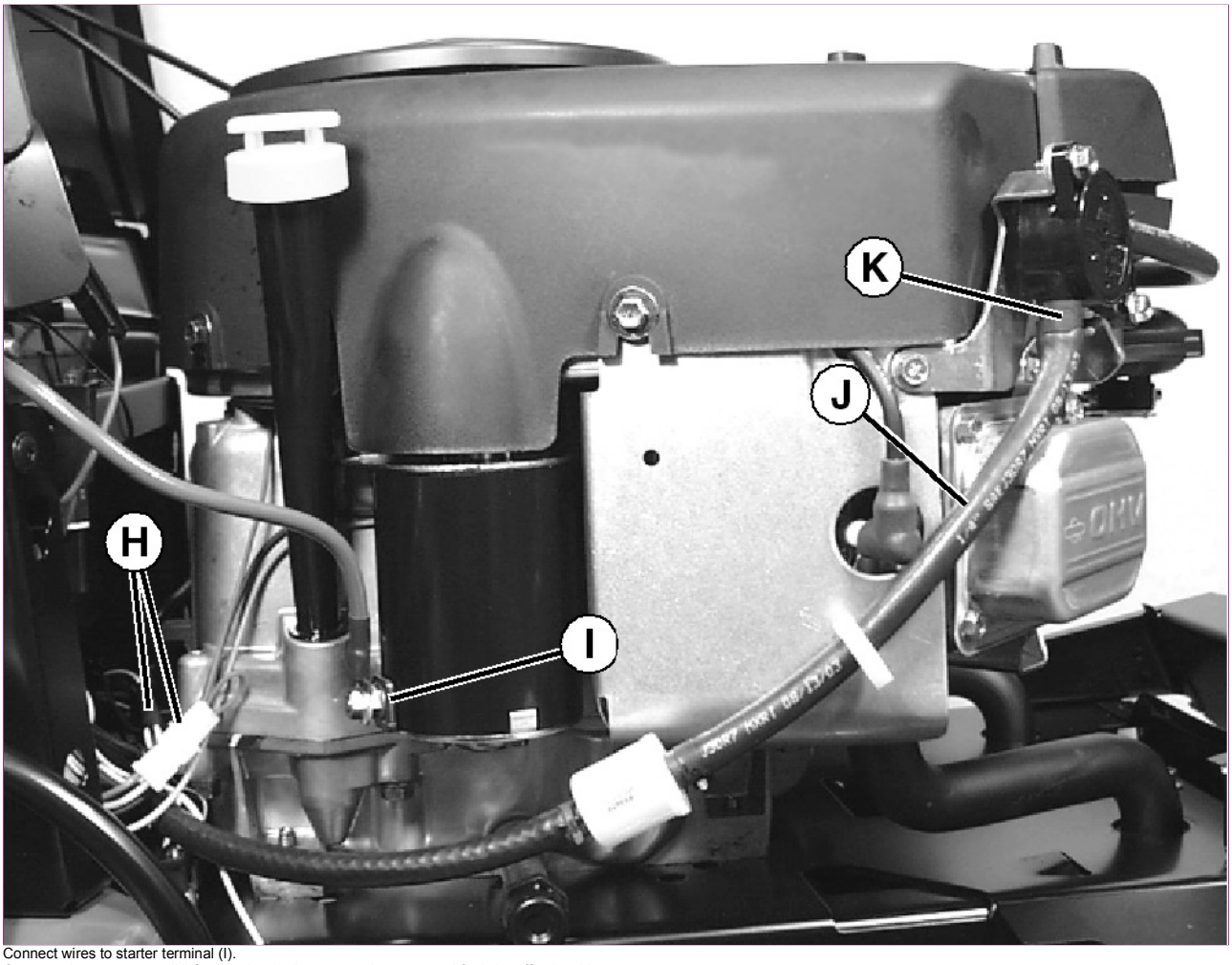
Procedure:

1. Set engine in machine frame with carburetor toward the front of the machine.
2. Install four engine mounting cap screws, washers, and nuts. Tighten cap screws to **32 N•m (24 lb-ft)** .
3. Inspect muffler flange for visual flatness and no obvious bends or kinks.
4. Install muffler with new gasket. Tighten muffler flange bolts to **24 N•m (18 lb-ft)** . Tighten muffler mounting bolts to **7 N•m (65 lb-in.)** .
5. Install engine output shaft key and engine sheave.
6. 

Install the electric PTO clutch assembly (C) so that it can move slightly back and forth on the anti-rotation bracket (B). The PTO clutch should be able to rotate freely within the slot in the clutch housing. If it does not rotate, perform the following:
   - Loosen the anti-rotation bracket mounting bolt (A).
   - Rotate the anti-rotation bracket to the left or right until the clutch moves freely on the bracket.
   - Hold the anti-rotation bracket in position and tighten the bracket mounting bolt.



7. Secure electric PTO clutch (D) with lock washer and cap screw (E). Tighten cap screw to **68 N•m (50 lb-ft)** .
8. Install traction drive belt (F) around engine sheave.
9. Connect wiring harness (G) to electric PTO clutch.



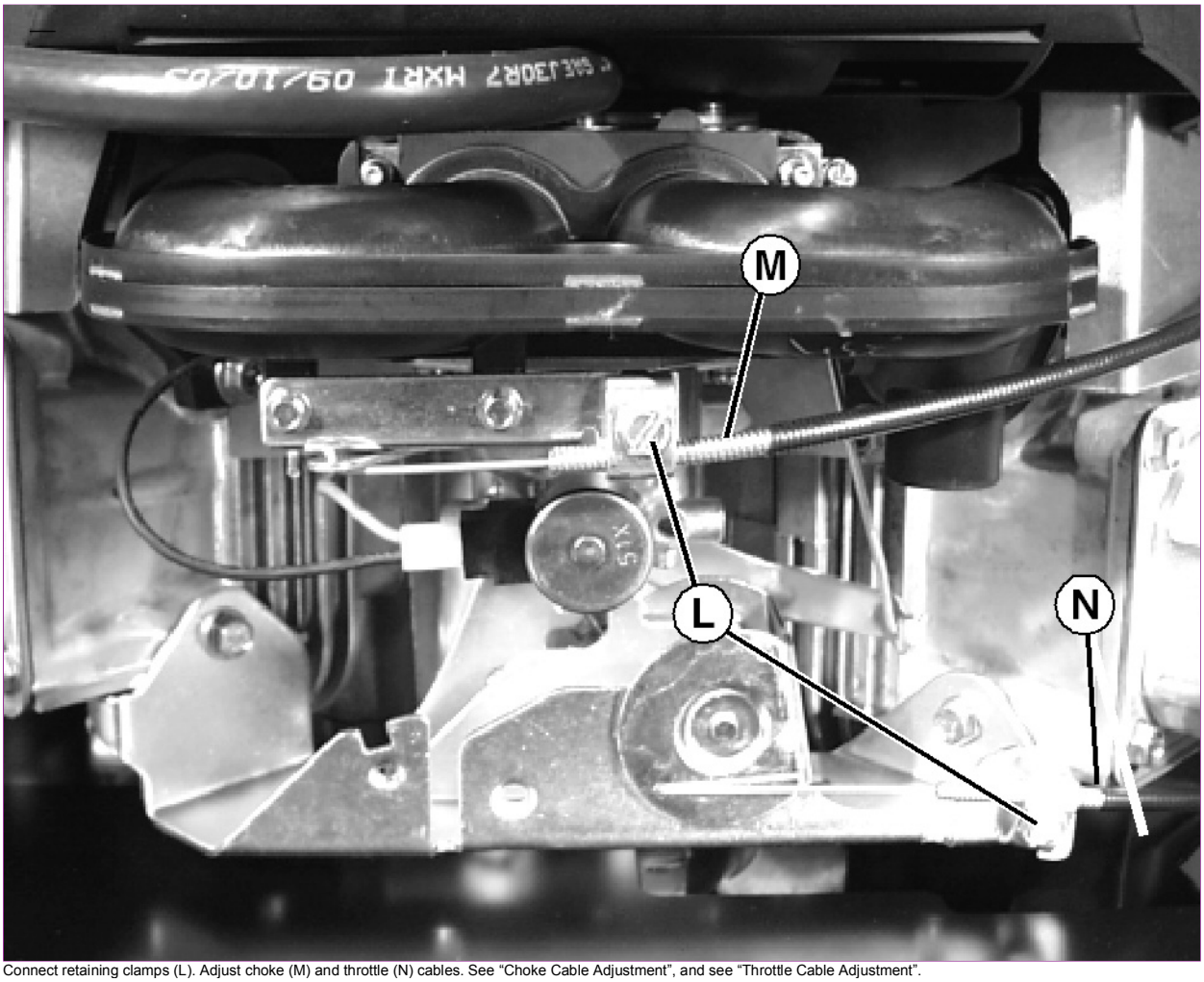
10. Connect wires to starter terminal (I).
11. Connect plug connectors (H) from main wire harness to the stator and fuel shutoff solenoid.
12.

CAUTION:

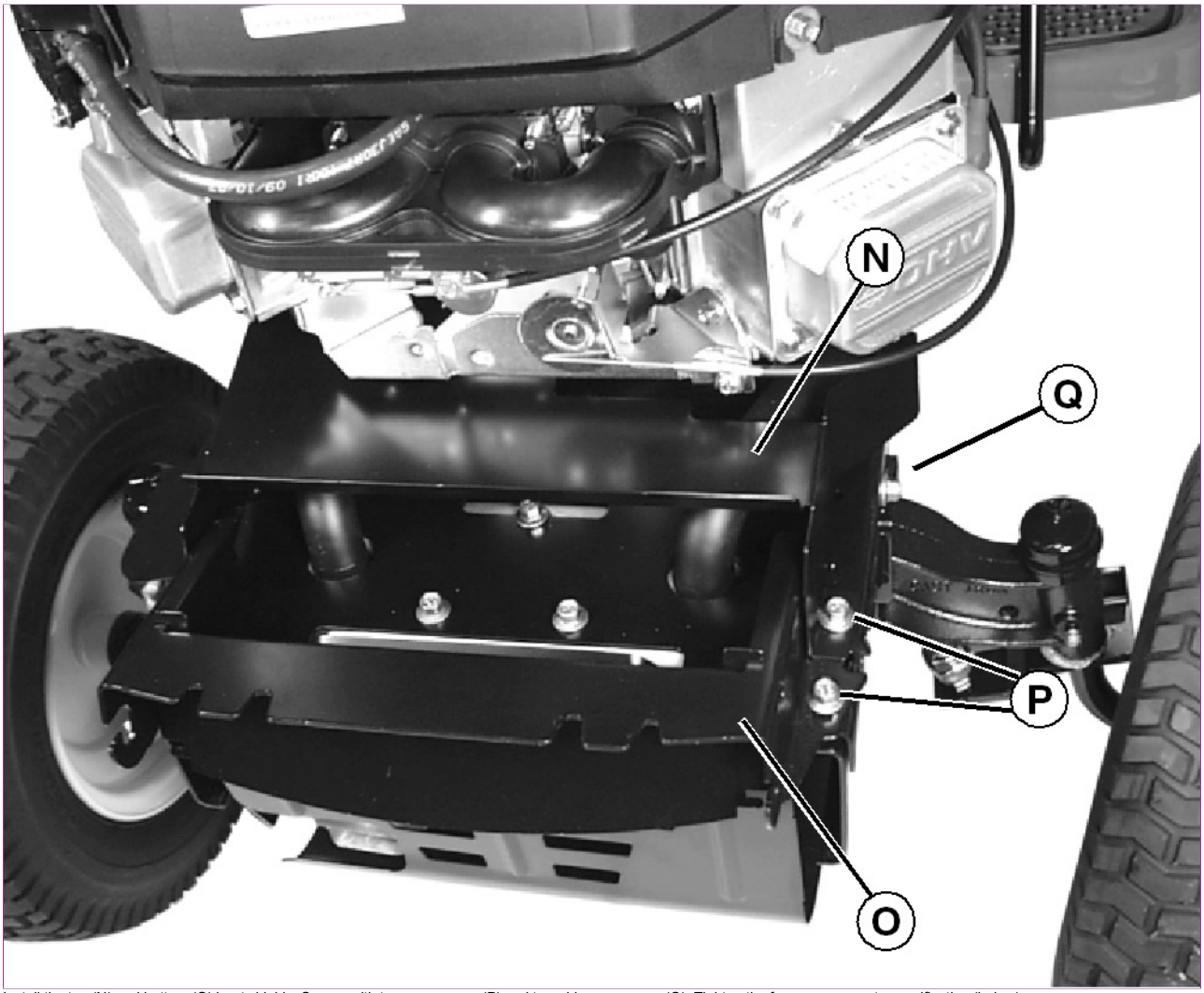
Fuel vapors are explosive and flammable:

- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Shut off engine before servicing.***
- ***Cool engine before servicing.***
- ***Work in a well-ventilated area.***
- ***Clean up spilled fuel immediately.***

Remove plug from fuel line hose (J) and connect to the fuel pump and secure with hose clamp (K).



13. Connect retaining clamps (L). Adjust choke (M) and throttle (N) cables. See “Choke Cable Adjustment”, and see “Throttle Cable Adjustment”.



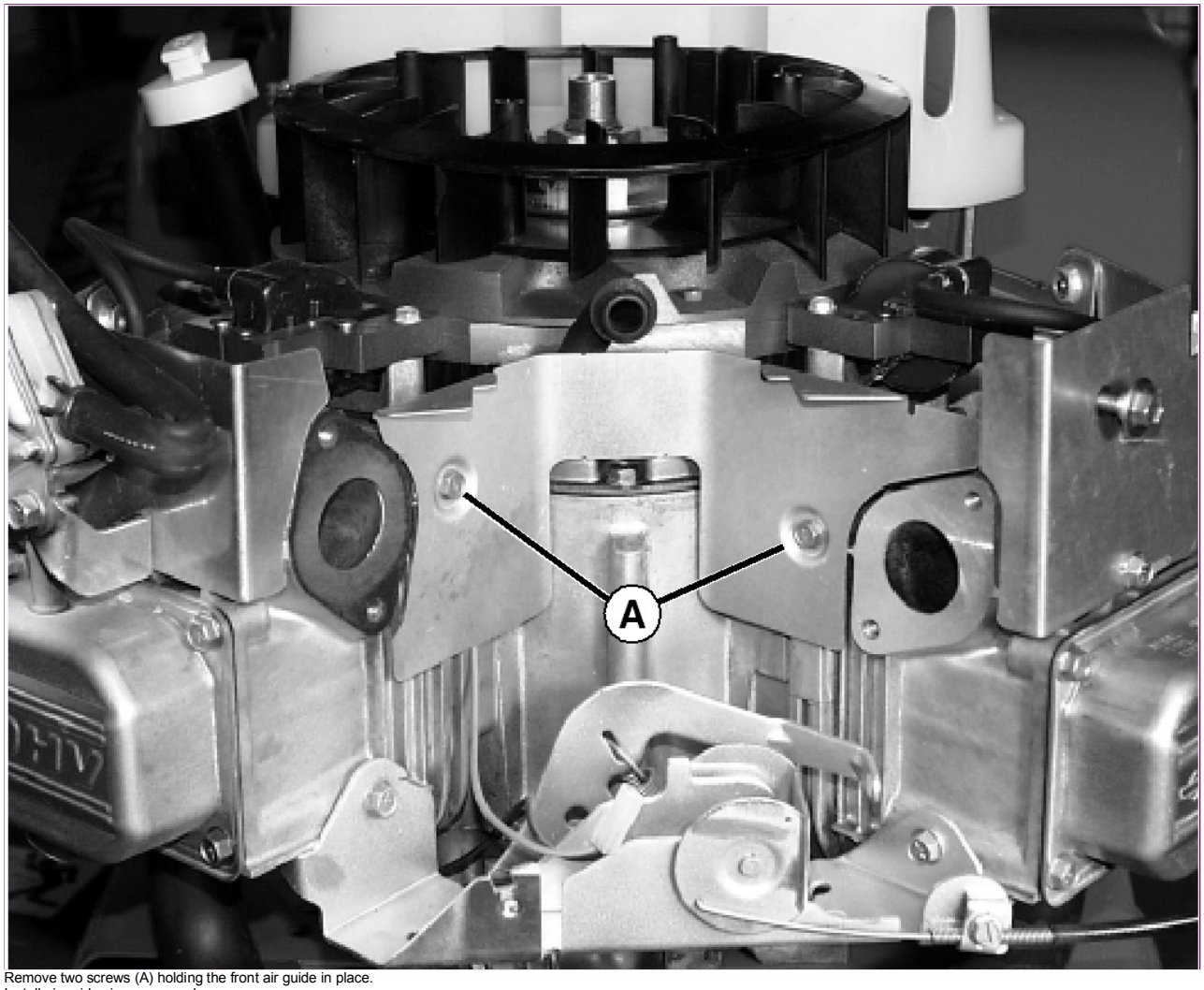
14. Install the top (N) and bottom (O) heat shields. Secure with two cap screws (P) and two side cap screws (Q). Tighten the four cap screws to specification (below).
15. Refill crankcase with engine oil.
16. Install hood. Connect headlight harness on right side of hood.
17. Connect negative (-) battery cable.
18. Install mower deck.

Item	Measurement	Specification
Specifications:		
Engine Mounting Cap Screws		32 N•m 24 lb-ft)
Exhaust Manifold		16 N•m 12 lb-ft)
Muffler to Frame		7 N•m 62 lb-in.)
PTO Clutch Bolt		68 N•m 50 lb-ft)
Heat Shield		7 N•m 65 lb-in.)
Oil Capacity With Filter		1.9 L 2.0 US qt)

Cylinder Air Guides Removal and Installation

Removal:

1. Remove upper blower housing. See Upper Blower Housing Removal and Installation .
2. Remove carburetor. See Carburetor Removal and Installation .
3. Remove two screws holding the fuel pump to the cylinder block.
4. Disconnect the fuel line to the carburetor and the pulse line to the valve cover.
5. Remove the remaining screw from the bottom of the air guide. Remove the air guide.
6. Remove three screws holding the left side air guide to the cylinder block.



7. Remove two screws (A) holding the front air guide in place.
8. Install air guides in reverse order.
9. Install carburetor.
10. Install carburetor linkage.
11. Install air filter assembly.
12. Install upper blower housing.

Item	Measurement	Specification
Specification:		
Air Guide Screws		7 N•m 62 lb-in.)

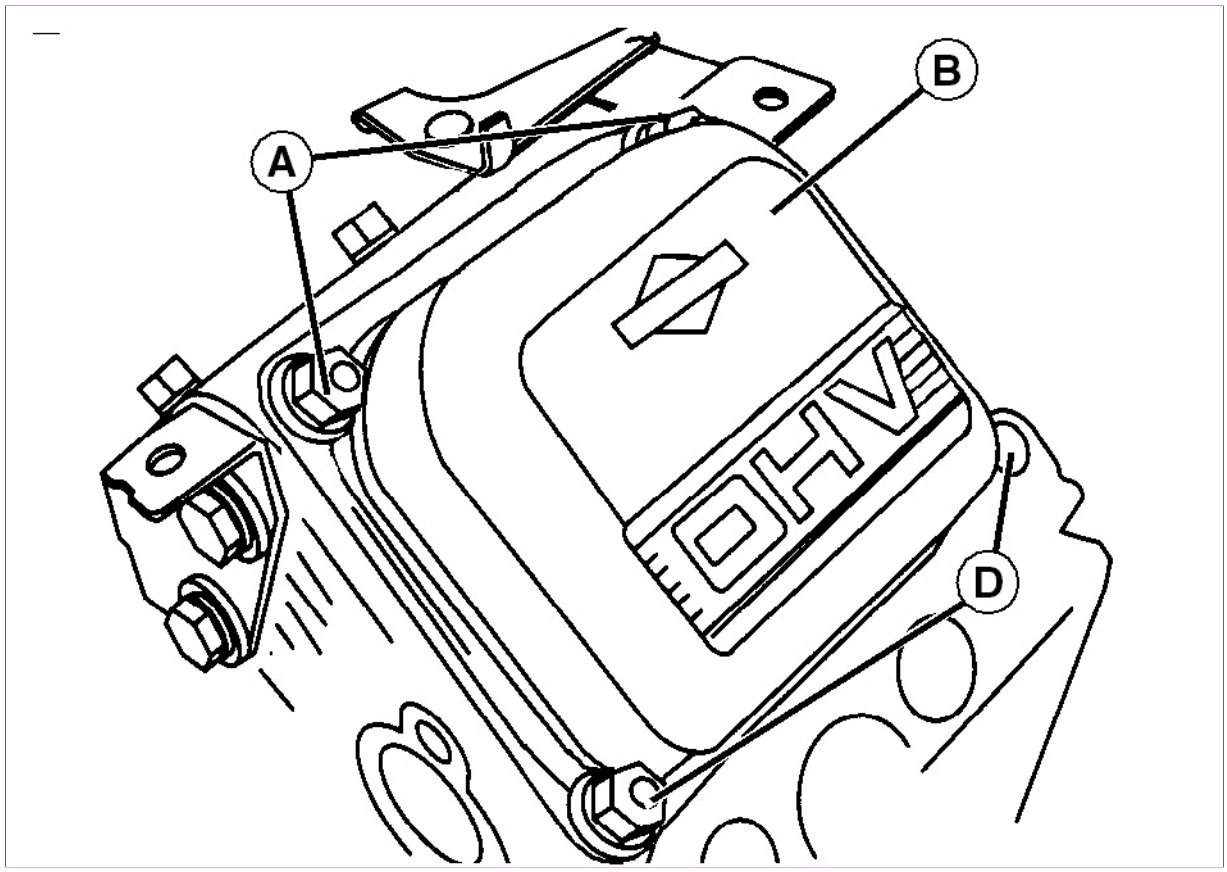
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Head Removal and Installation

Cylinder Head Removal and Installation

IMPORTANT:

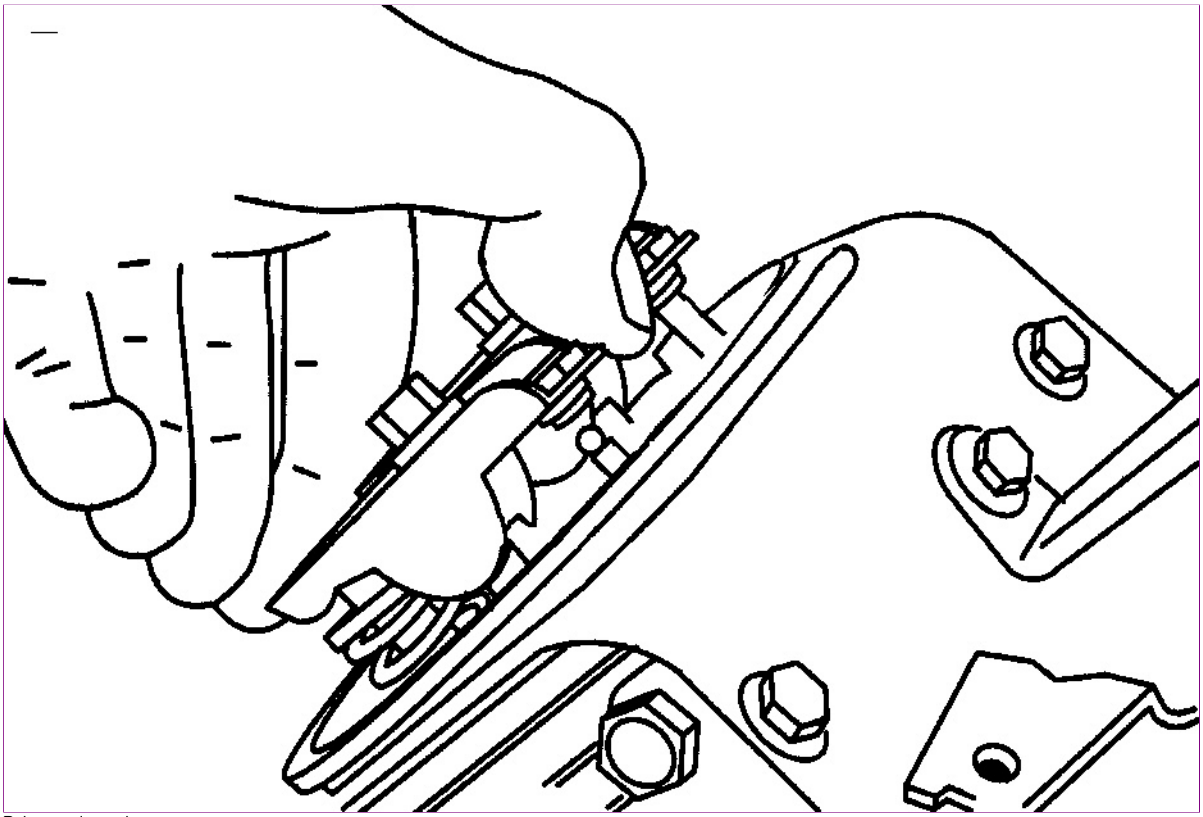
Mark all parts when disassembling cylinder heads to prevent interchanging.

Removal:

1. Remove carburetor and associated components. See Carburetor Removal and Installation .
2. Disconnect spark plug leads. Remove spark plugs.
3. Loosen governor lever nut.
4. Remove governor control bracket and governor lever.
5. Remove cylinder air guides. See Cylinder Air Guides Removal and Installation .
6. 

Remove cap screws (A), and valve cover (B). Repeat for second cylinder, if being removed.
7. *NOTE:*

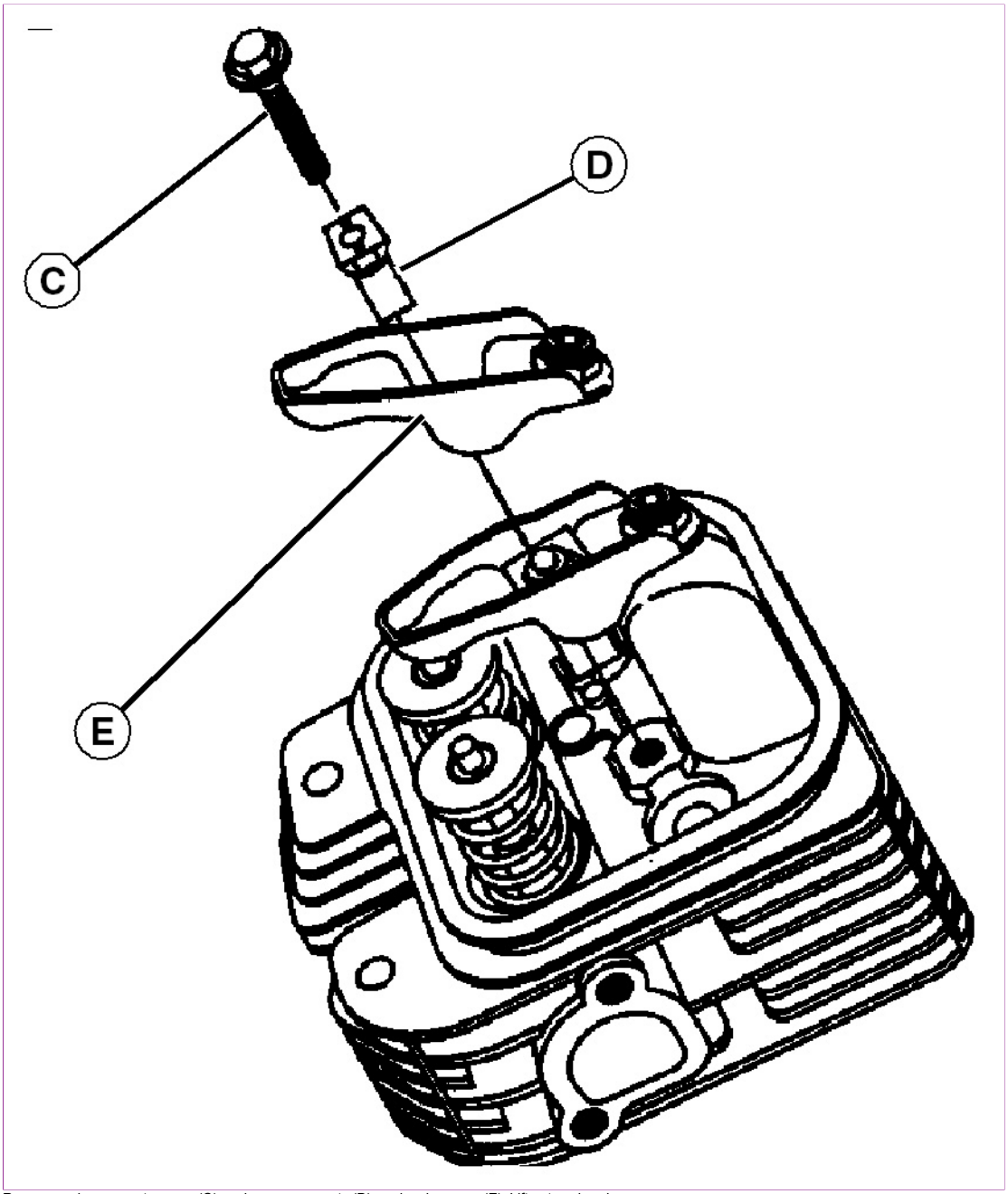
   To release spring pressure from rocker arm, rock the arm against spring pressure and allow push rod to drop out of the rocker arm socket. Push rod will move out of position, releasing valve spring pressure.



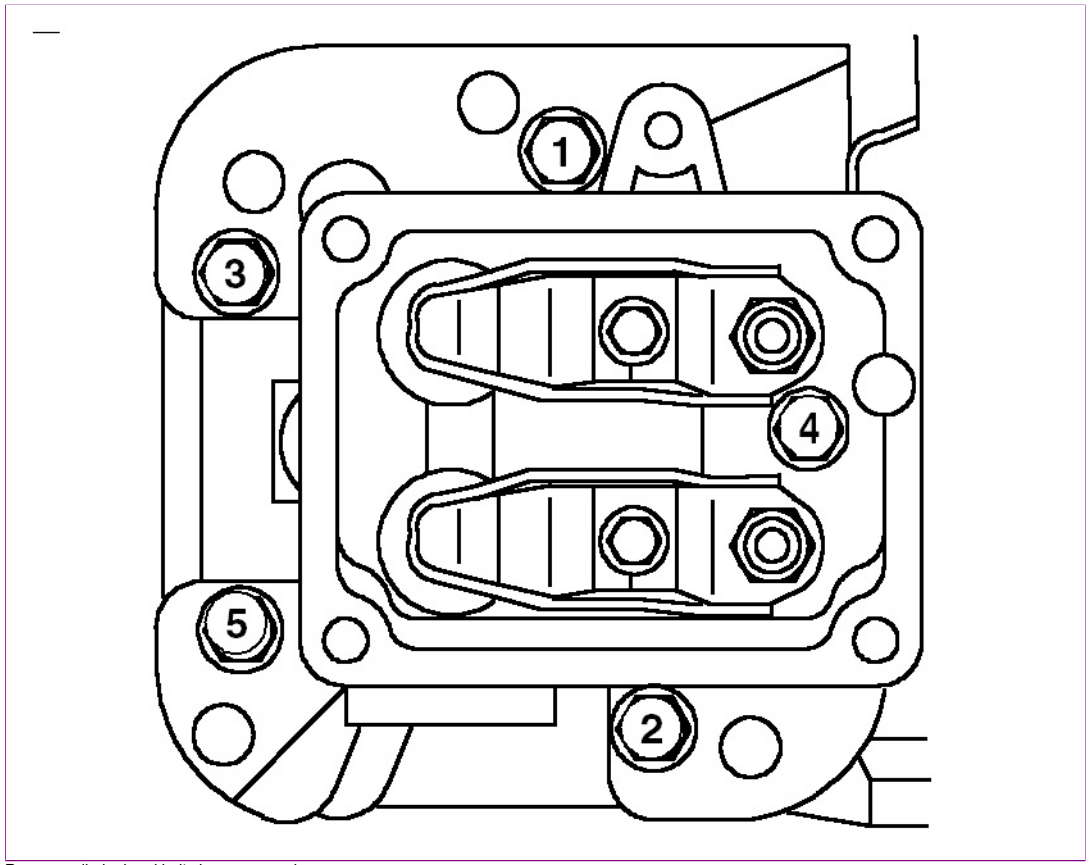
Release valve spring pressure.

8. **IMPORTANT:**

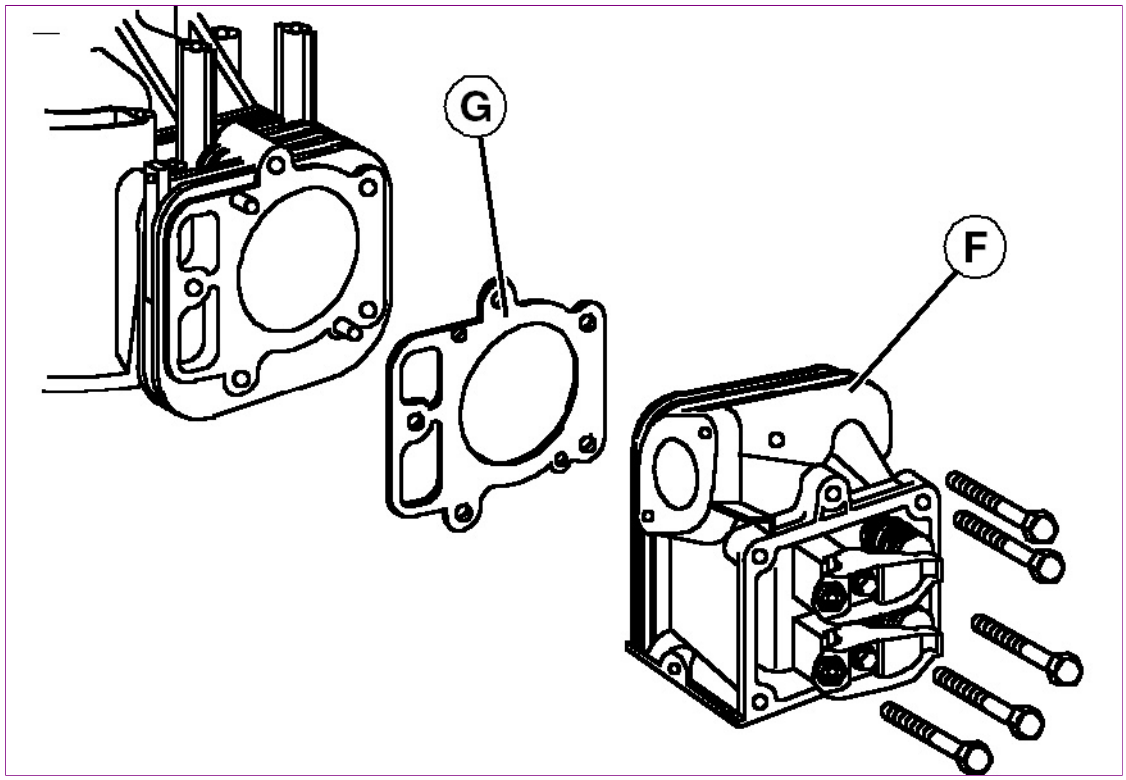
   Intake valve push rods are aluminum. Exhaust valve push rods are steel. Identify the push rods to prevent interchange.



Remove rocker support screws (C), rocker arm supports (D), and rocker arms (E). Lift out push rods.



9. Remove cylinder head bolts in sequence shown.



10. Remove cylinder head (F) and gasket (G).

Installation:

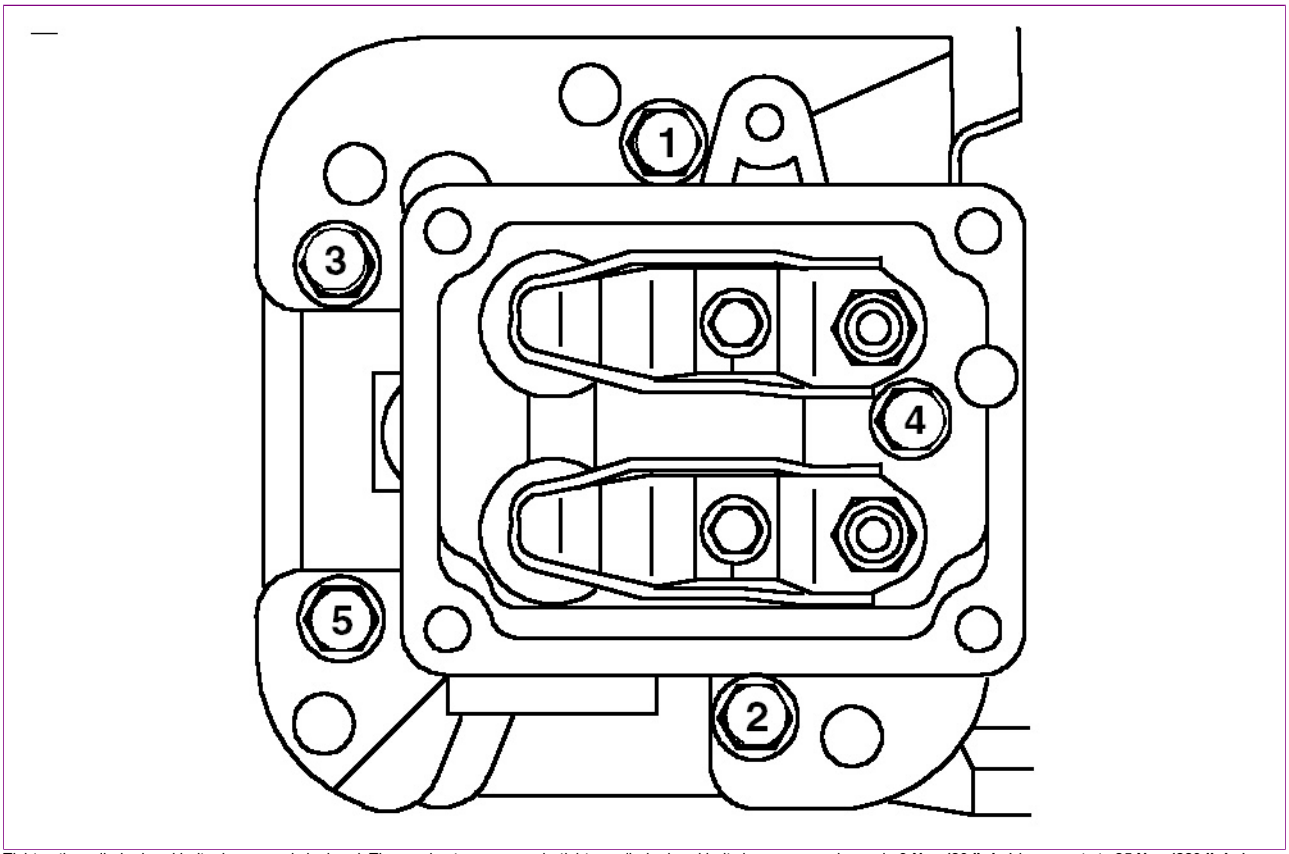
1. Clean gasket surfaces.
2. **IMPORTANT:**

Do not use sealer of any kind on gaskets.

Place new gasket and the cylinder head on cylinder. Align head with the alignment sleeves in the cylinder.

3. Apply a small amount of clean engine oil to threads. Install five cylinder head cap screws.
4. **IMPORTANT:**

   Do not tighten one bolt down completely before all the others have been tightened to the second stage. Uneven tightening may warp the cylinder head.

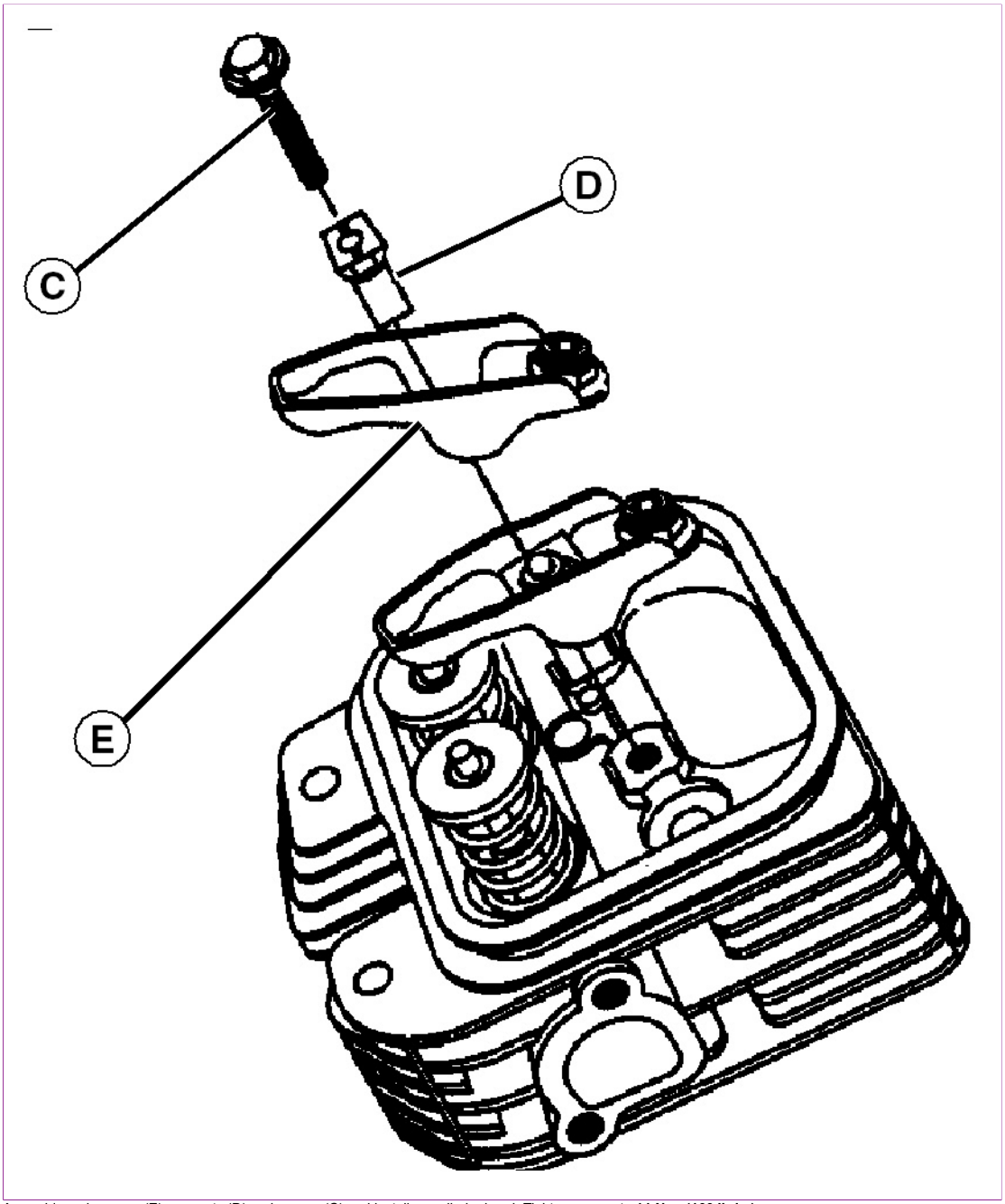


Tighten the cylinder head bolts down evenly by hand. Then, using torque wrench, tighten cylinder head bolts in sequence shown, in **9 N•m (80 lb-in.)** increments to **25 N•m (220 lb-in.)** .

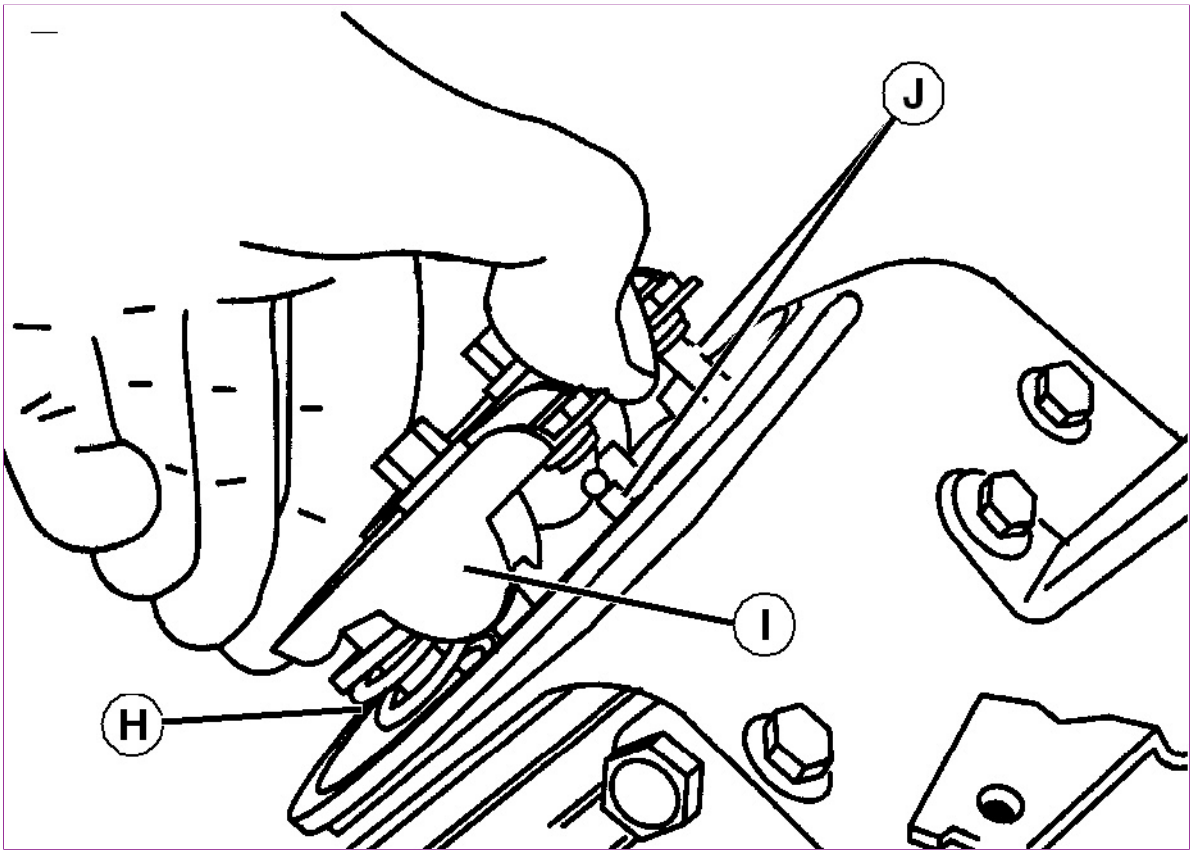
5. **IMPORTANT:**

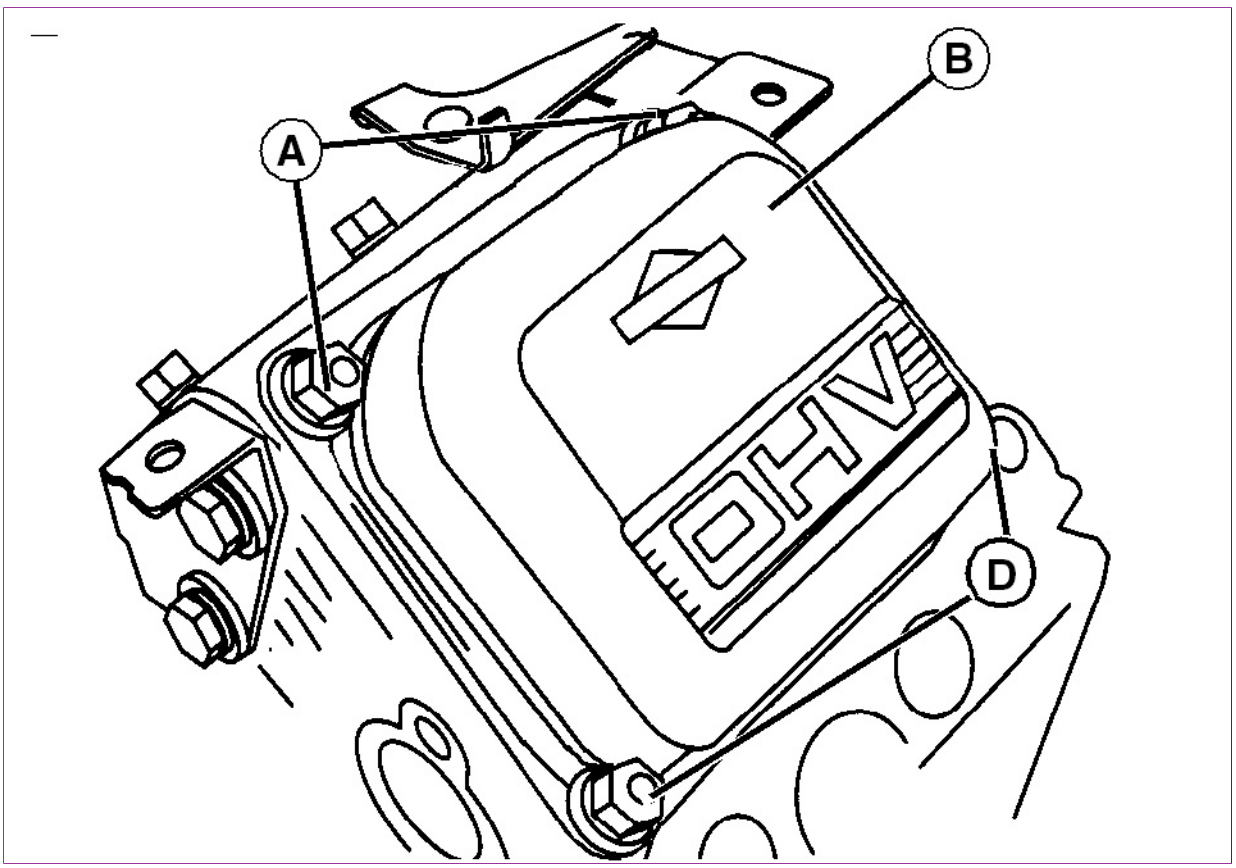
   Intake valve push rods are aluminum. Exhaust valve push rods are steel. Identify the push rods to prevent interchange.

Insert push rods into recess in tappets.



6. Assemble rocker arms (E), supports (D) and screws (C) and install on cylinder head. Tighten screws to **11 N•m (100 lb-in.)** .

7. 

Compress valve spring (H) with rocker arm (I) and insert push rod (J) into rocker arm socket. Be sure push rods remain seated in recess in tappets.
8. Tighten rocker support bolts to **11 N•m (100 lb-in.)** .
9. Adjust valves. See Valve Clearance Adjustment .
10. 

Install new gasket and valve cover (B). Tighten cap screws (A) to **11 N•m (100 lb-in.)** .
11. Install intake and exhaust manifold, carburetor, governor control bracket, cylinder air guides, blower housing and air cleaner assembly.

12. Install spark plugs. Tighten to **20 N•m (180 lb-in.)** .
13. Install spark plug leads.
14. Adjust governor. See Governor Static Adjustment and See Governor Dynamic Adjustment .

Item	Measurement	Specification
Specifications:		
Cylinder Head Bolts (final)		25 N•m 18 lb-ft)
Rocker Studs		11 N•m 100 lb-in.)
Valve Cover		11 N•m 100 lb-in.)
Spark Plugs		20 N•m 180 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cylinder Head Inspection and Repair

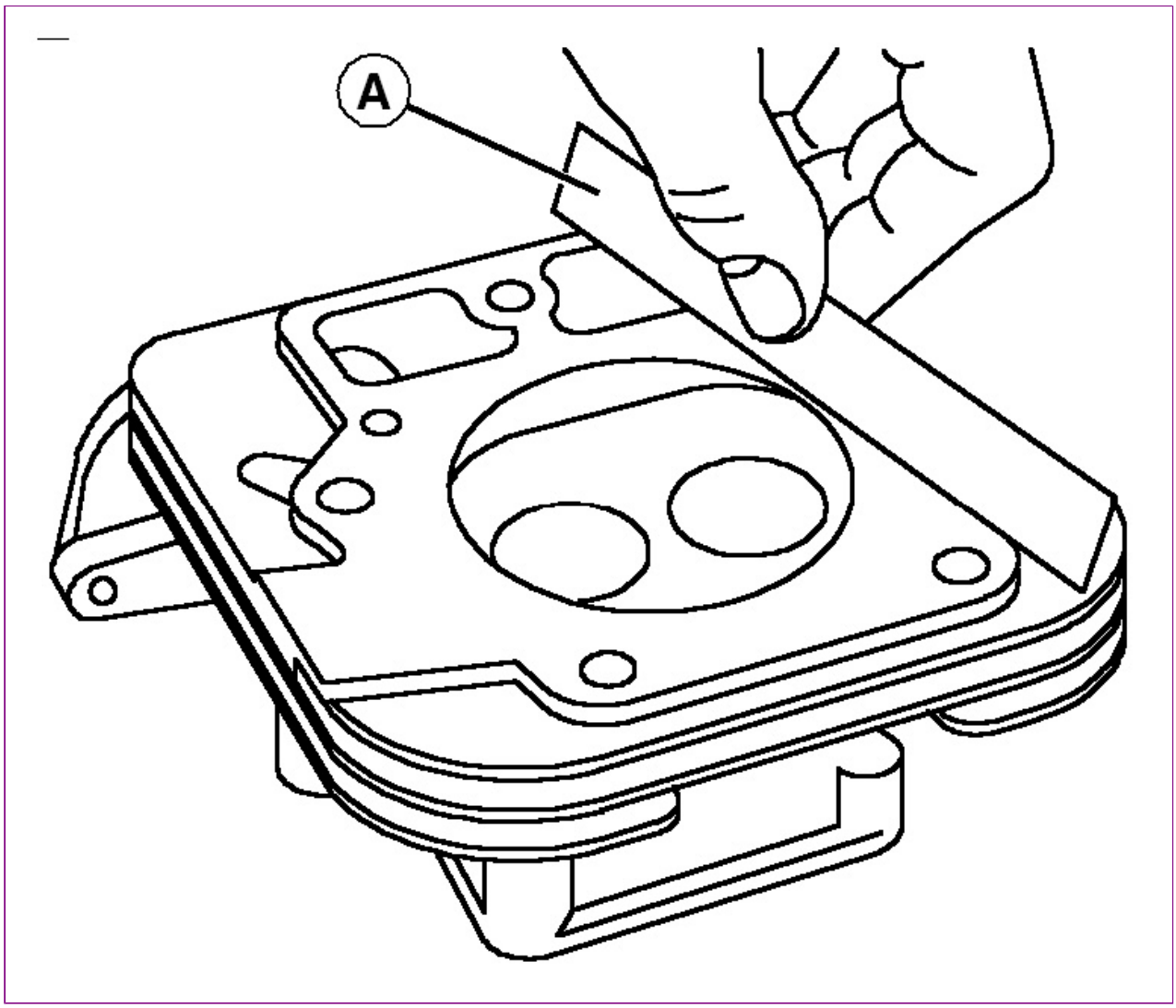
Cylinder Head Inspection and Repair

Procedure:

1. **IMPORTANT:**

   Prevent combustion chamber deposits from entering push rod or oil return cavity in cylinder. Do not damage cylinder, top of piston, cylinder head and cylinder head gasket surfaces. Remove only the combustion chamber deposits. It is not necessary to remove the discoloration marks on the piston, valves and cylinder head. These marks are normal and will not affect engine operation.

   Remove combustion chamber deposits from combustion chamber and around valves using a soft, hand wire brush or scraper. With piston at TDC, remove combustion chamber deposits from top of piston.
2. Inspect cylinder head for broken fins or cracks. Repeat procedure for other cylinder head and cylinder.
3. Be sure that all gasket material is removed from cylinder head.



4. Using a surface plate or straight edge (A), check cylinder head mounting surface for distortion in several areas. If mounting surfaces are distorted more than **0.1 mm (0.004 in.),** replace cylinder head.
5. *NOTE:*

   Valve guides are not serviceable.

Inspect valve guides by inserting plug gauge into valve guide. If plug gauge inserts **6.4 mm (0.25 in.)** or more, the cylinder head must be replaced. If plug gauge is not available, the rejection dimension for both intake and exhaust valve guides is **6.09 mm (0.240 in.)** .

Item	Measurement	Specification
Specifications:		
Maximum Cylinder Head Warpage		0.1 mm 0.004 in.)
Valve Guide Reject Dimension		6.09 mm 0.240 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Valve Removal

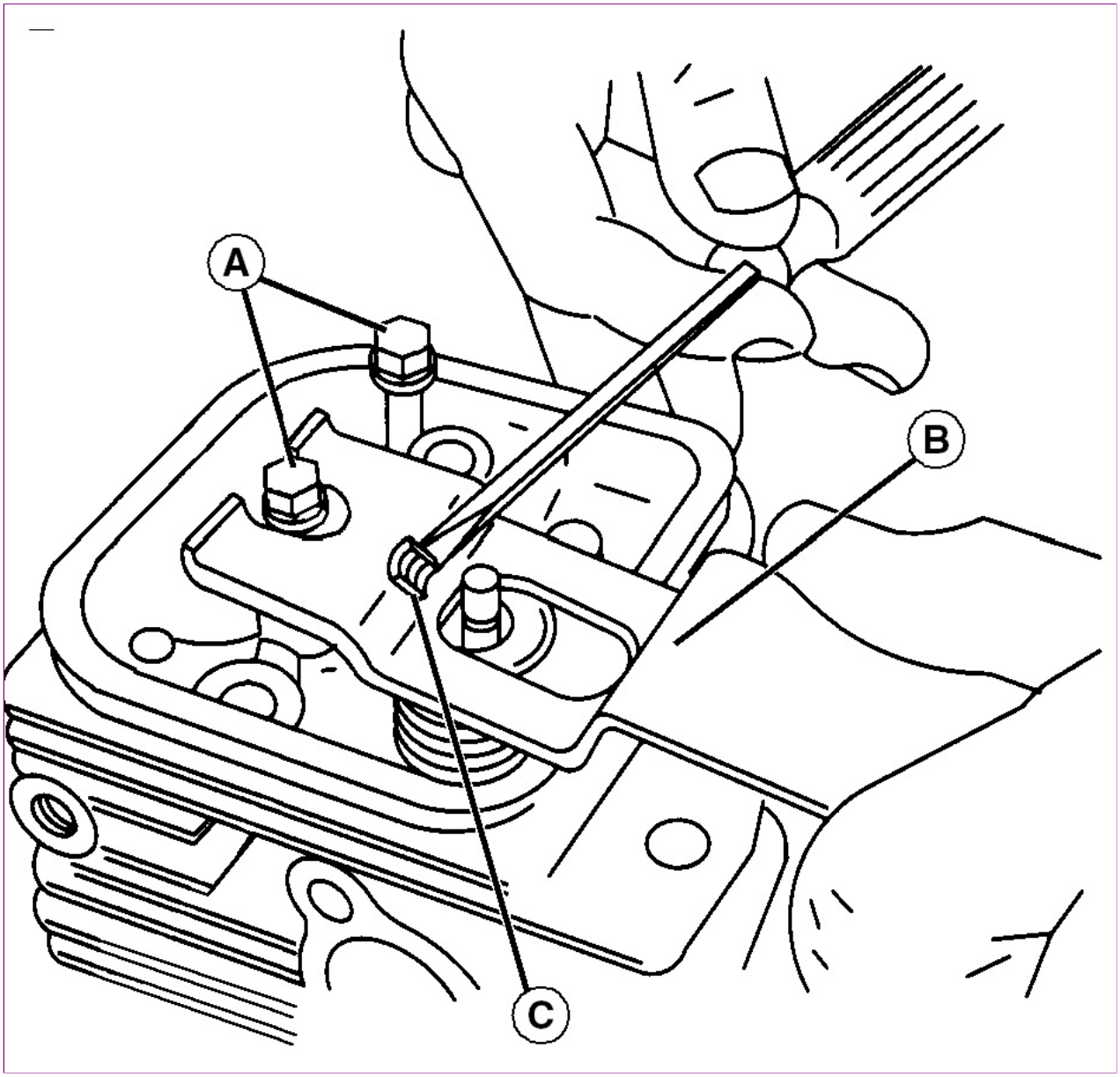
Valve Removal

Procedure:

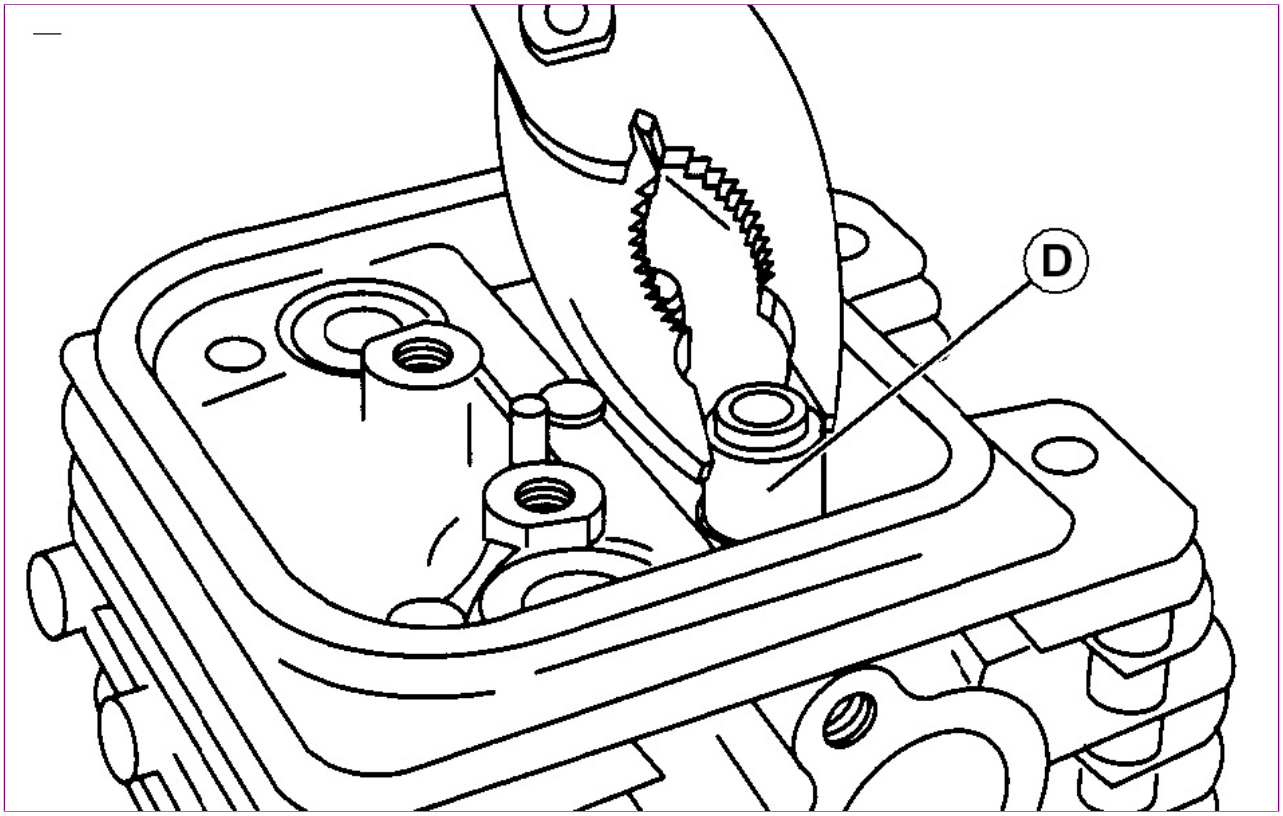
1. **IMPORTANT:**

   Mark push rods for reassembly in their original position. Intake push rods are aluminum. Exhaust push rods are steel. Do not interchange the push rods.

   To remove the valves, place cylinder head on workbench with support to hold valves in place.



2. Reinstall rocker screws (A) into cylinder head. Do not tighten. Slip end of Valve Spring Compressor (B) under the screw of the valve spring. Press down on tool handle to compress valve spring and remove split retainers (C).
3. Gradually release pressure. Remove retaining washer and spring.
4. Remove rocker screws.
5. Repeat procedure on other cylinder head.

6. 

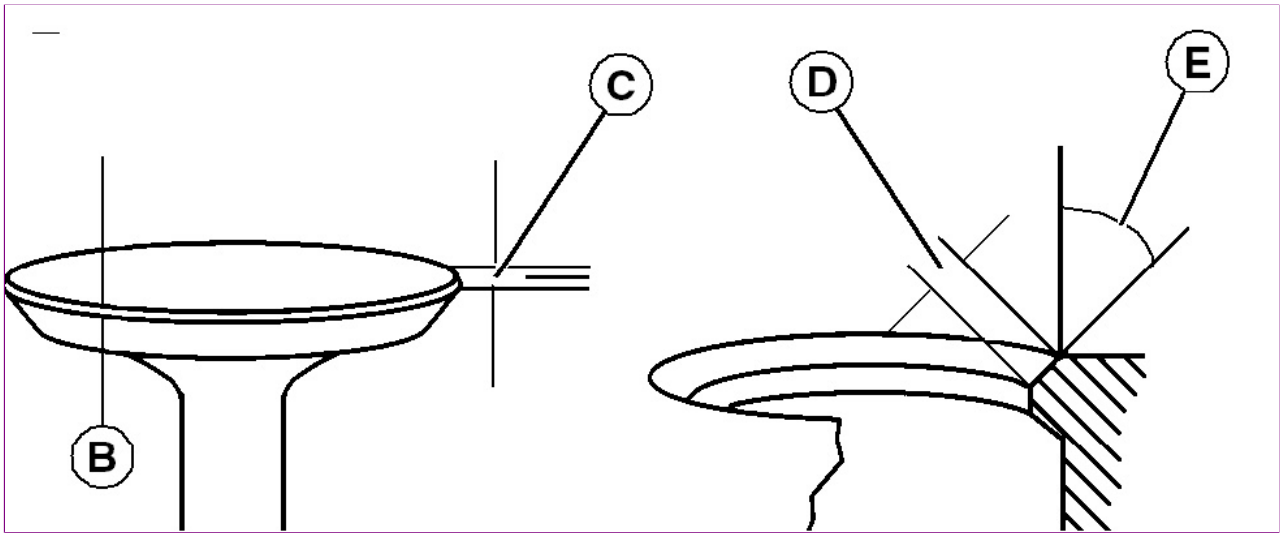
Remove intake valve stem seal (D) by grasping with pliers and pulling up while turning.

IMPORTANT:

Replace valve stem seals whenever valves are removed.

Valve Inspection and Repair

Procedure:

1. 

Faces on valves may be resurfaced with a valve grinder to 45 (E). Recondition valve seats using Valve Seat Cutter. Valves and seats should then be lapped with Valve Lapping Tool and Valve Lapping Compound. See Valves Lap . Remove grinding marks and assure a good seal between valve and seat. Thoroughly clean lapping compound from valve seat and valve face.
2. Valve margin (B) should be **0.8 mm (0.031 in.)** (C). If **0.4 mm (0.016 in.)** or less, resurface or replace valve.
3. Valve seat width (D) should be **0.8 - 1.2 mm (0.031 - 0.047 in.)** .
4. If seat is wider, it may be narrowed using Valve Seat Cutter. Use 30 side of cutter to narrow the seats. If the valve is badly burned, it should be replaced. Replace valve if margin is badly burned; if damaged, replace cylinder head. **Valve seats are not replaceable** .
5. Measure valve stem diameter **40 mm (1.6 in.)** from end of valve. Replace if less than **5.92 mm (0.233 in.)** in diameter.
6. Inspect valve springs and replace if broken or worn. Replace if free length is less than **33.50 mm (1.319 in.)** .
7. *NOTE:*

   Valve guides are not serviceable.

   Inspect valve guides by inserting plug gauge into valve guide. If plug gauge inserts **6.35 mm (0.250 in.)** or more, the cylinder head must be replaced. If plug gauge is not available, the rejection dimension for both intake and exhaust valve guides is **6.09 mm (0.240 in.)** .

Item	Measurement	Specification
Specifications:		
Valve Guide Wear Limits		6.10 mm 0.240 in.)
Valve Stem Wear Limits Intake		5.92 mm 0.233 in.)
Valve Stem Wear Limits Exhaust		5.92 mm 0.233 in.)
Valve Seat Width		1.2 - 1.6 mm 0.047 - 0.063 in.)
Valve Margin (minimum)		0.4 mm 0.016 in.)
Valve Guide Depth		7.10 mm 0.280 in.)
Valve Face Angle		45
Valve Seat Narrowing Angle		30
Valve Spring Free Length (min.)		33.50 mm 1.319 in.)

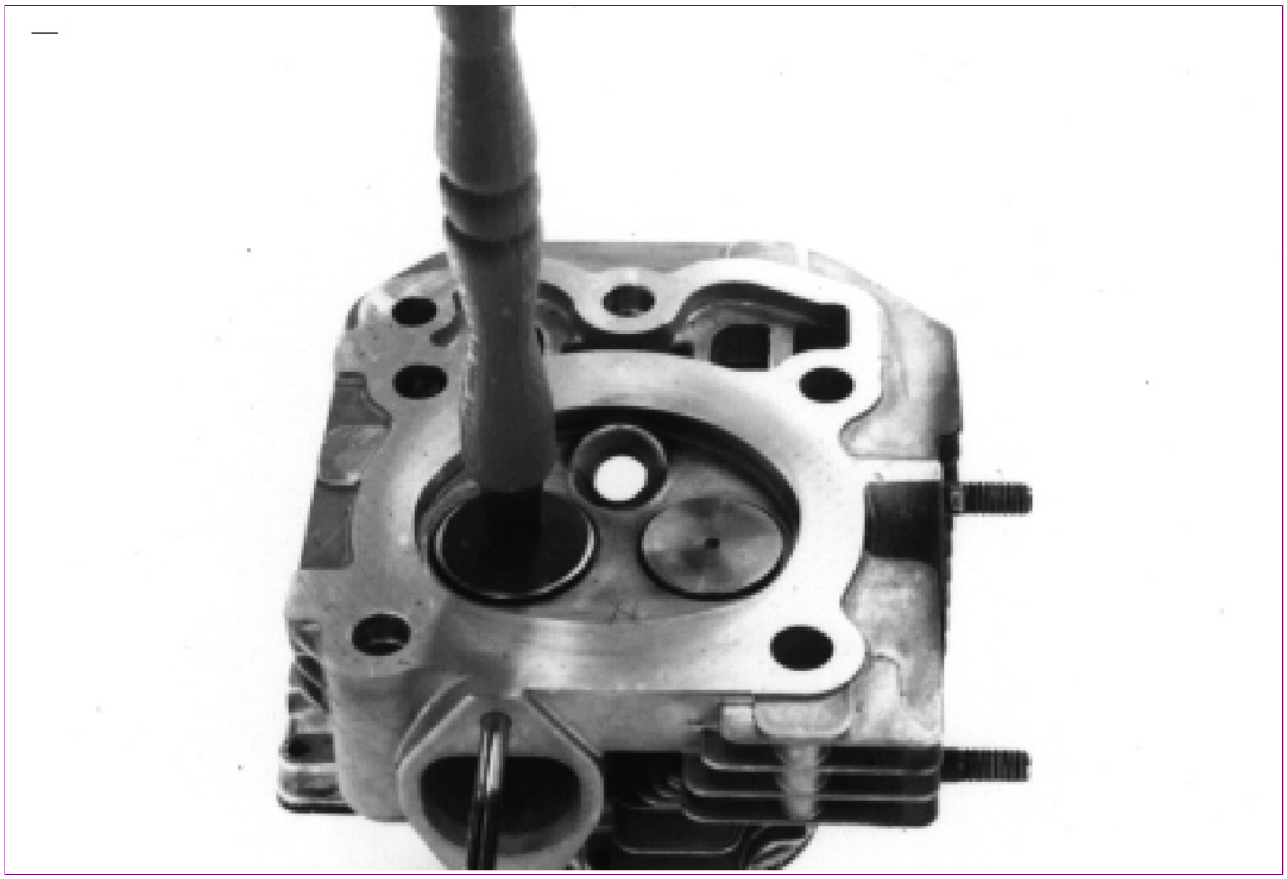
Valves Lap

Special or Required Tools:

- Lapping Tool

Procedure: IMPORTANT:

Valves and seats should be lapped if they do not make good contact



1. Apply light coat of lapping compound to valve face, then turn valve in seat using vacuum cup tool.
2. Check valve every eight strokes until a uniform ring appears around surface of valve face.
3. Wash parts in solvent to remove lapping compound.
4. Check position of lap mark on face - lap mark must be on or near center of valve face.

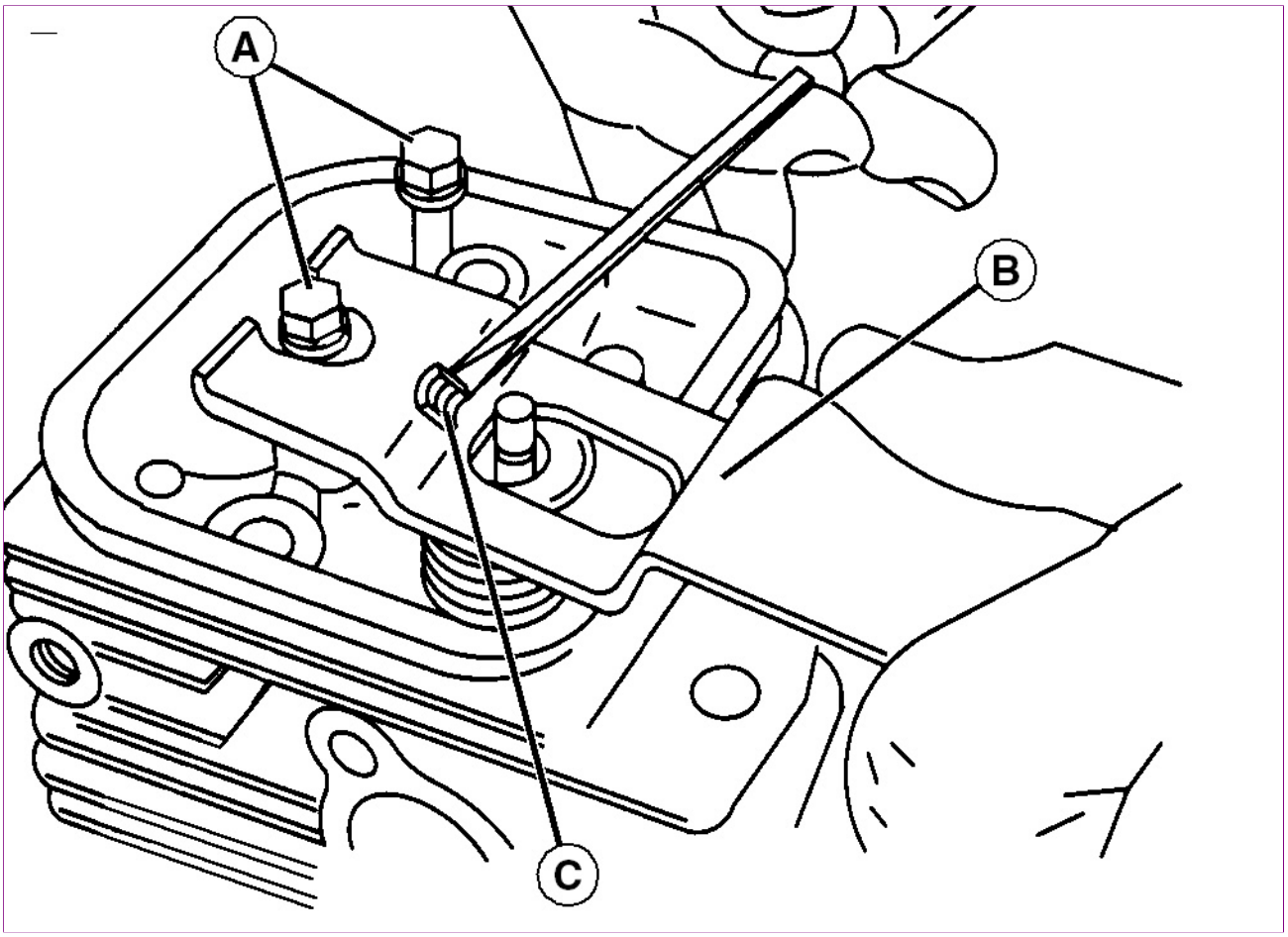
Valve Installation

Procedure:

1. **IMPORTANT:**

   Replace valve stem seals whenever valves are removed.

   Install a new intake valve stem seal using a valve guide driver.
2. Lightly coat valve stems with valve guide lubricant. Install valves.



3. Install springs and valve spring retainers over valve stems. Temporarily install rocker studs (A) in cylinder head.
4. With Valve Spring Compressor (B), compress spring and install split retainers (C). Repeat procedure for other valves.
5. Remove rocker studs.
6. Install cylinder head(s) and follow cylinder head assembly procedures. See Cylinder Head Removal and Installation .

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Pistons, Rings and Rods Removal and Installation

Pistons, Rings and Rods Removal and Installation

Procedure:

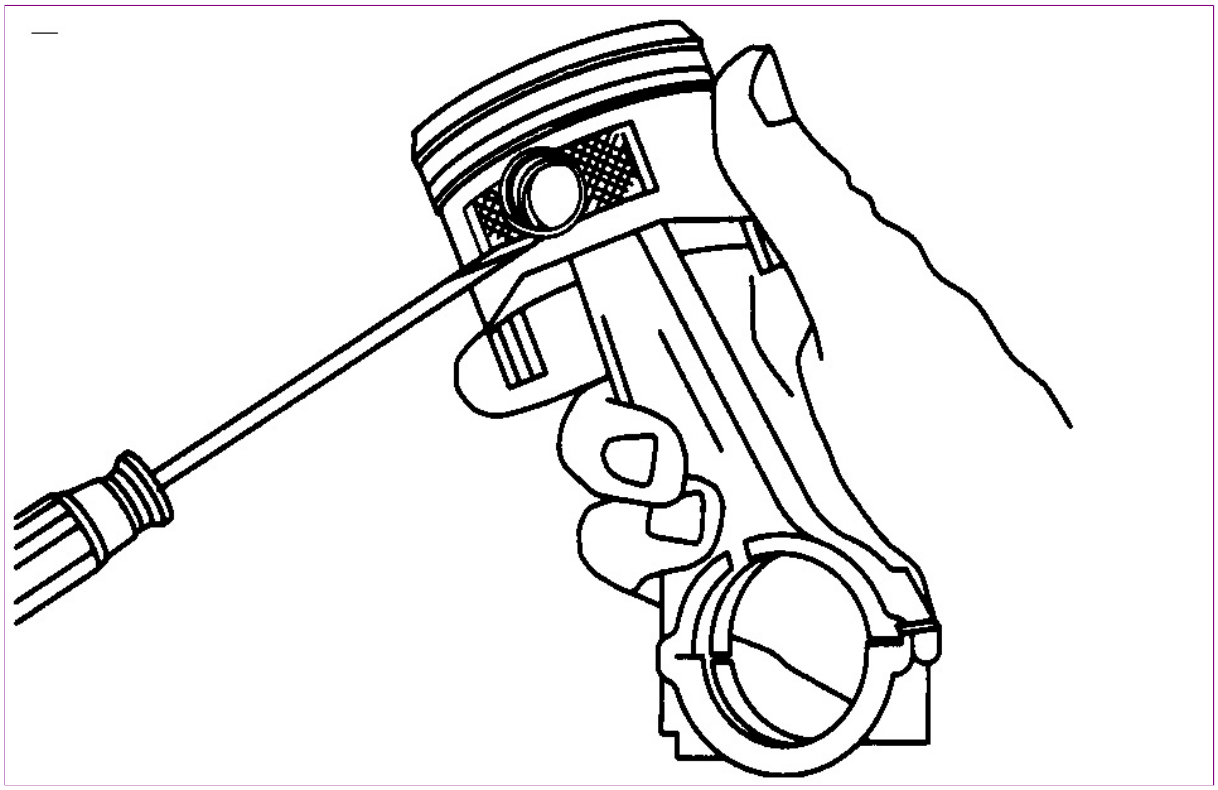
1. Remove air filter and bracket, upper blower housing, flywheel, alternator, carburetor, intake manifold and governor linkage.
2. Remove starting motor, cylinder heads and crankcase cover.
3. **IMPORTANT:**

   When servicing pistons, rings, piston pins or rods, each component must be kept for the cylinder that it was removed from. Mark each set before removing from the engine.

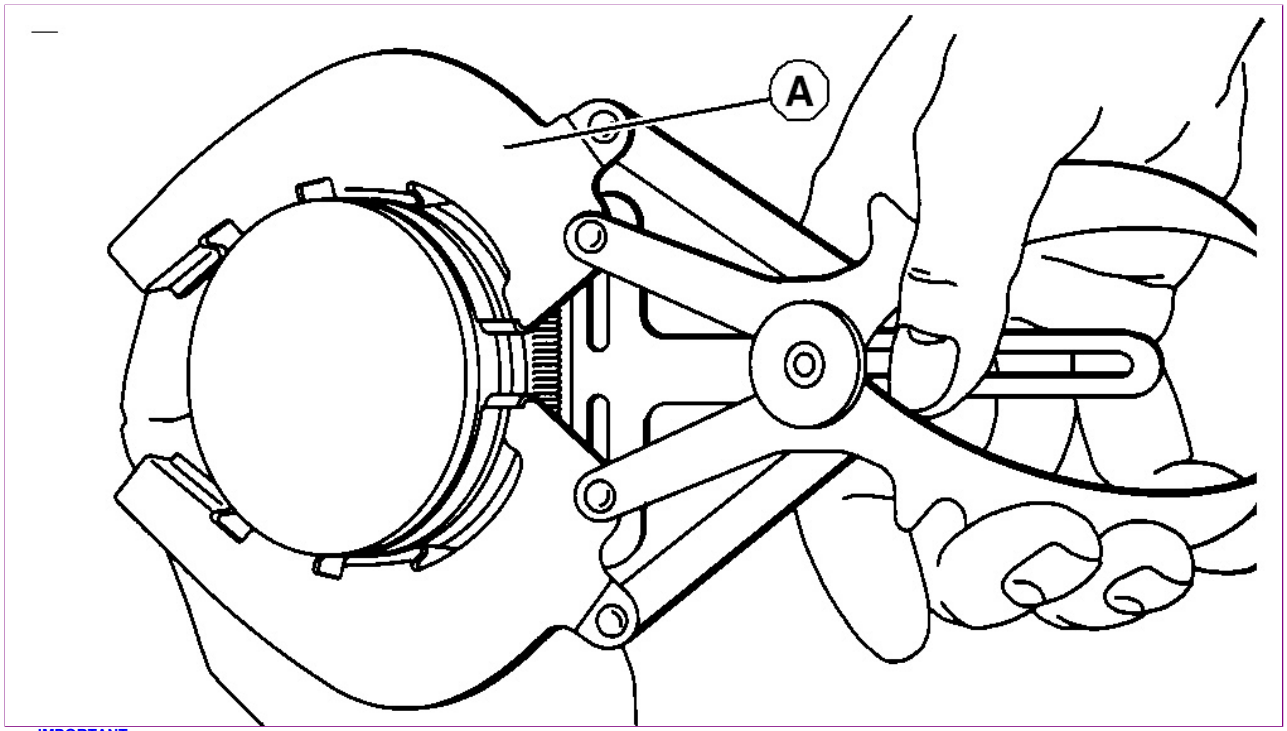
   NOTE:

   Remove any carbon or ridge at the top of the cylinder bore. This will prevent breaking the rings when removing the piston and connecting rod from the engine.

   Remove the connecting rod cap. Then push the piston and connecting rod out through the top of the cylinder.



4. To remove connecting rod from piston, remove piston pin locks with screwdriver. Piston pin is a push fit in piston and rod. Deposits may build up on piston pin and require the piston pin to be pressed out.



5. **IMPORTANT:**

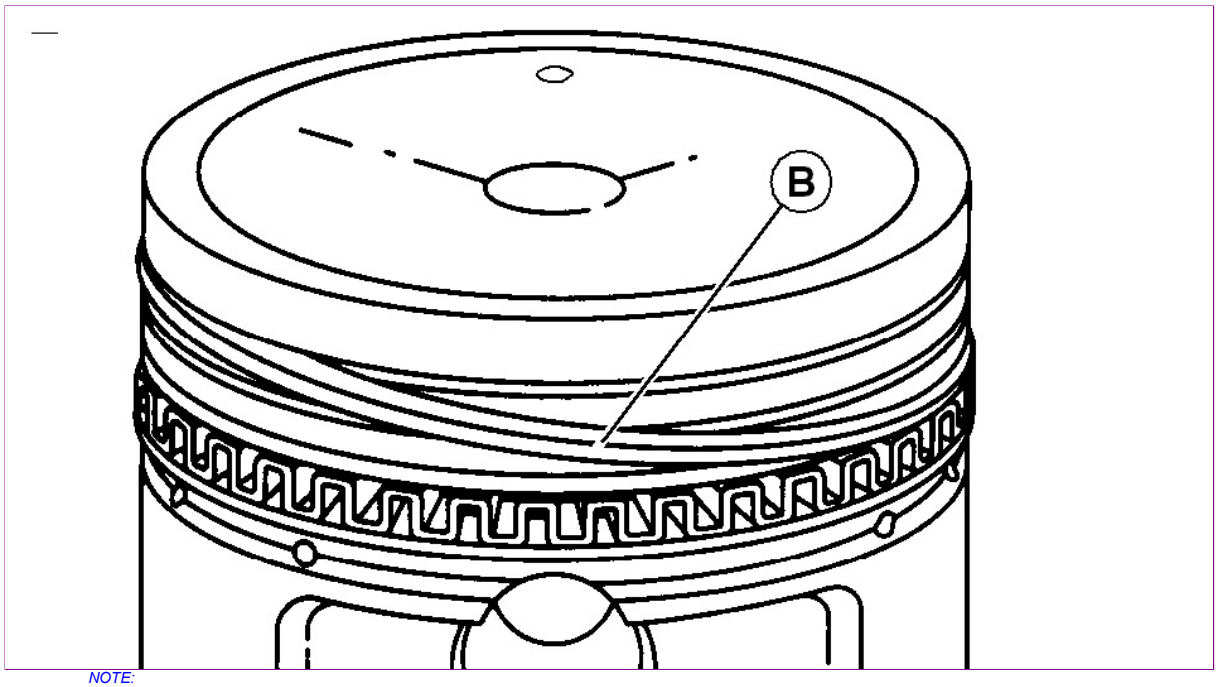
   Remove top and center compression rings using ring expander (A). New piston rings must be installed whenever the engine is disassembled for major servicing or overhaul, providing that cylinder bores are within specifications.

Remove top and center compression rings.

6. *NOTE:*

   Measure cylinder bores before checking pistons and rings. If cylinder bores require re-sizing, it will not be necessary to check pistons and rings since a new oversized piston assembly will be used.See Cylinder Bore Inspection.

If cylinder bore is more than **0.08 mm (0.003 in.)** oversize, or **0.004 mm (0.076 in.)** out of round, it must be resized.



7. *NOTE:*

   Oil control ring (B) is shown being spiraled into compression ring groove.

Spiral top oil control ring (B) from oil ring groove into center compression ring groove. Repeat into top compression ring groove, and then off piston. Repeat for bottom oil control ring.

Checking End Gap:

1. *NOTE:*

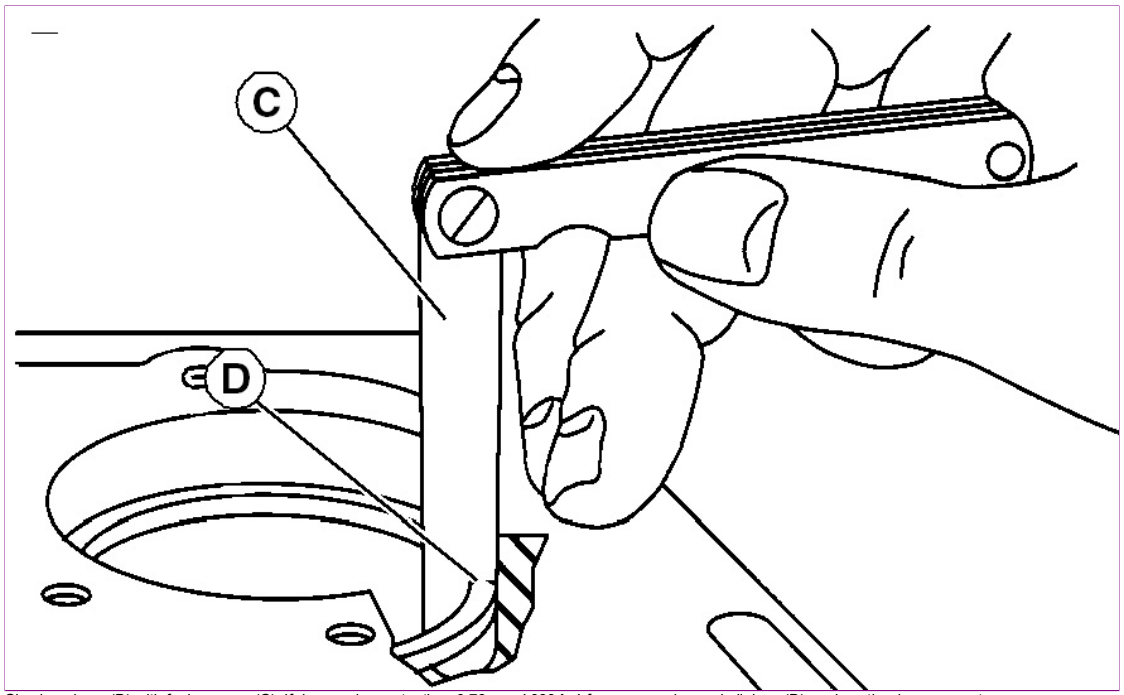
   If the cylinder is going to be resized, there is no reason to check the piston, since a new oversized piston assembly must be used. If however, the cylinder is not going to be resized and the piston shows no sign of wear or scoring, check the piston rings.

   Replace the piston rings any time the engine is overhauled or disassembled.

2. Insert rings one at a time approximately **25.4 mm (1.0 in.)** down into cylinder bore.

   CAUTION:

   Wear gloves or cover rings with a rag. The top and bottom edges of the ring may be extremely sharp. Personal injury could occur. Never reuse worn piston rings.



3. Check end gap (D) with feeler gauge (C). If ring gap is greater than **0.76 mm (.030 in.)** for compression and oil rings (D), replace the rings as a set.
   A worn ring will usually show scratches caused by abrasives and/or have a shiny appearance. Never reuse worn piston rings.

   NOTE:

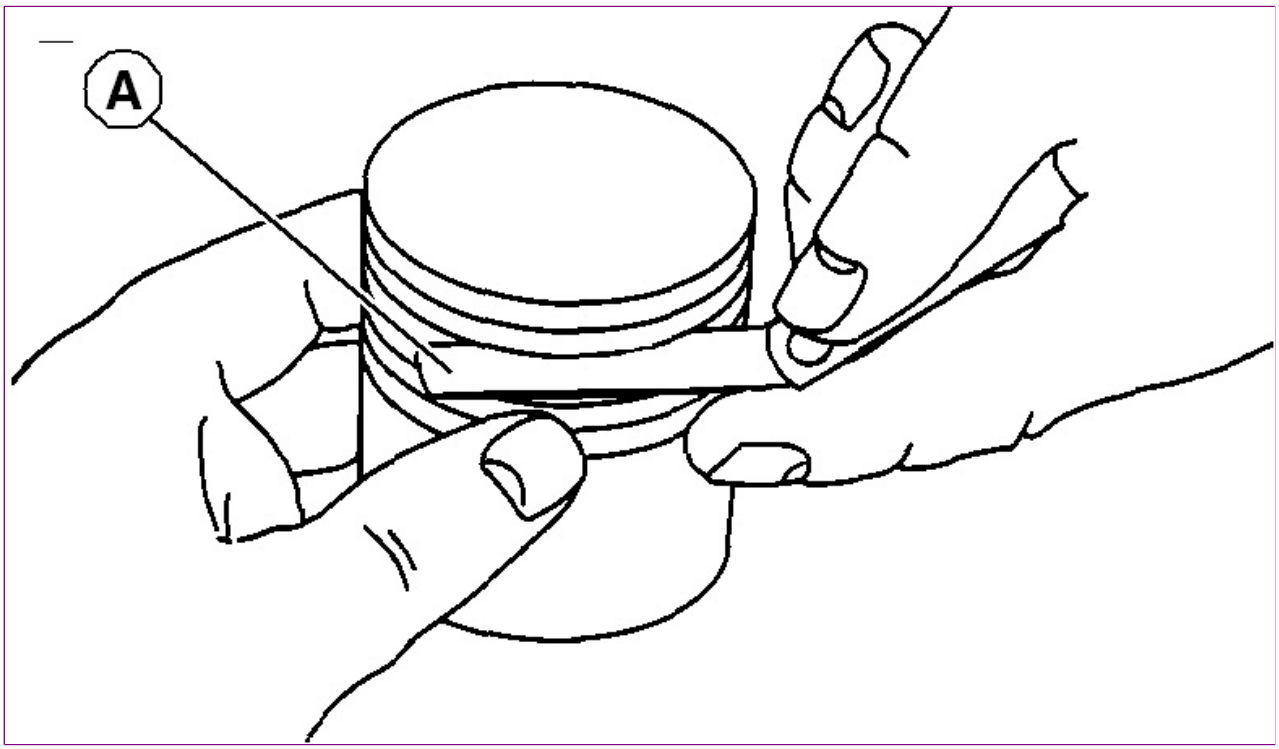
   Before installing new piston rings, restore the proper cross hatch angle in the cylinder bores. The correct cylinder cross hatch ensures proper lubrication and piston ring rotation. *See Cylinder Bore Honing .*

Item	Measurement	Specification
Wear Limit Specifications:		
Ring End Gap (All)		0.76 mm 0.030 in.)
Cylinder Oversize		0.102 mm 0.004 in.)
Cylinder Out of Round		0.076 mm 0.003 in.)

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Piston Inspection

Piston Inspection

Procedure:

1. Clean carbon from top two ring grooves.
2. Place a new ring in each piston groove.
3. 

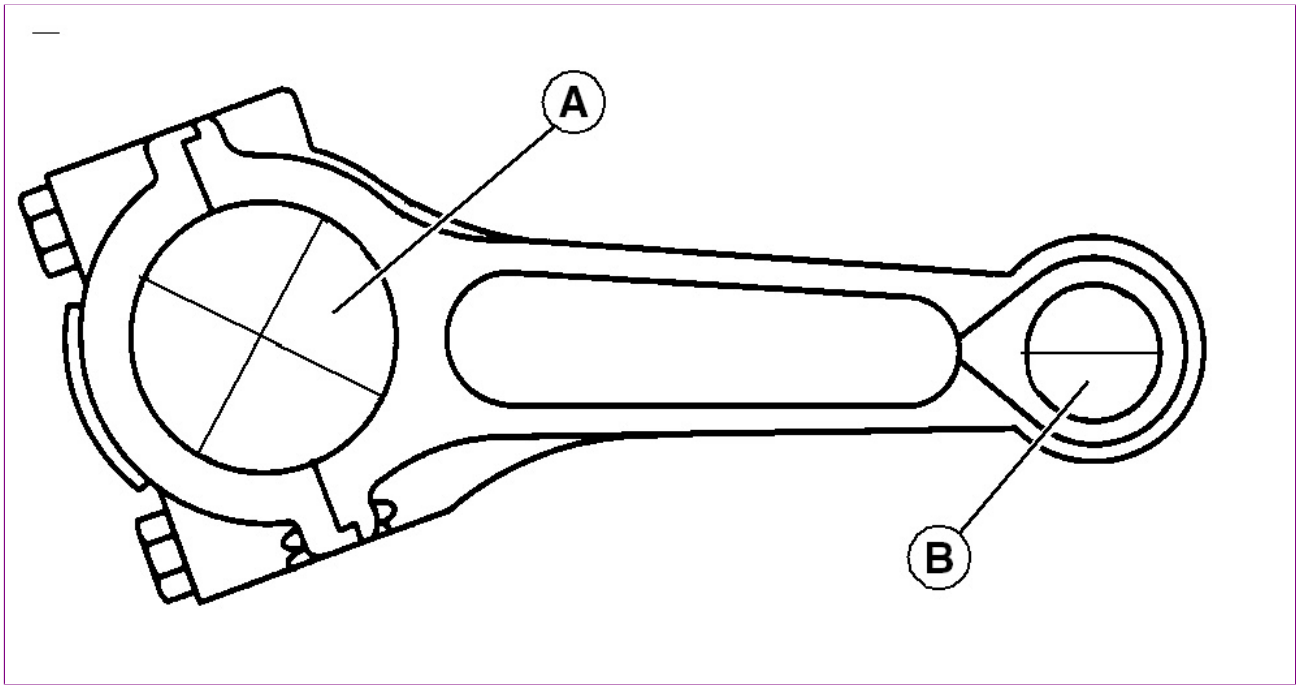
If a **0.12 mm (.005 in.)** or larger feeler gauge (A) can be inserted in the each ring groove, the ring grooves are worn and the piston should be replaced.

Item	Measurement	Specification
Wear Limit Specification:		
Ring Groove (All)		0.12 mm 0.005 in.)

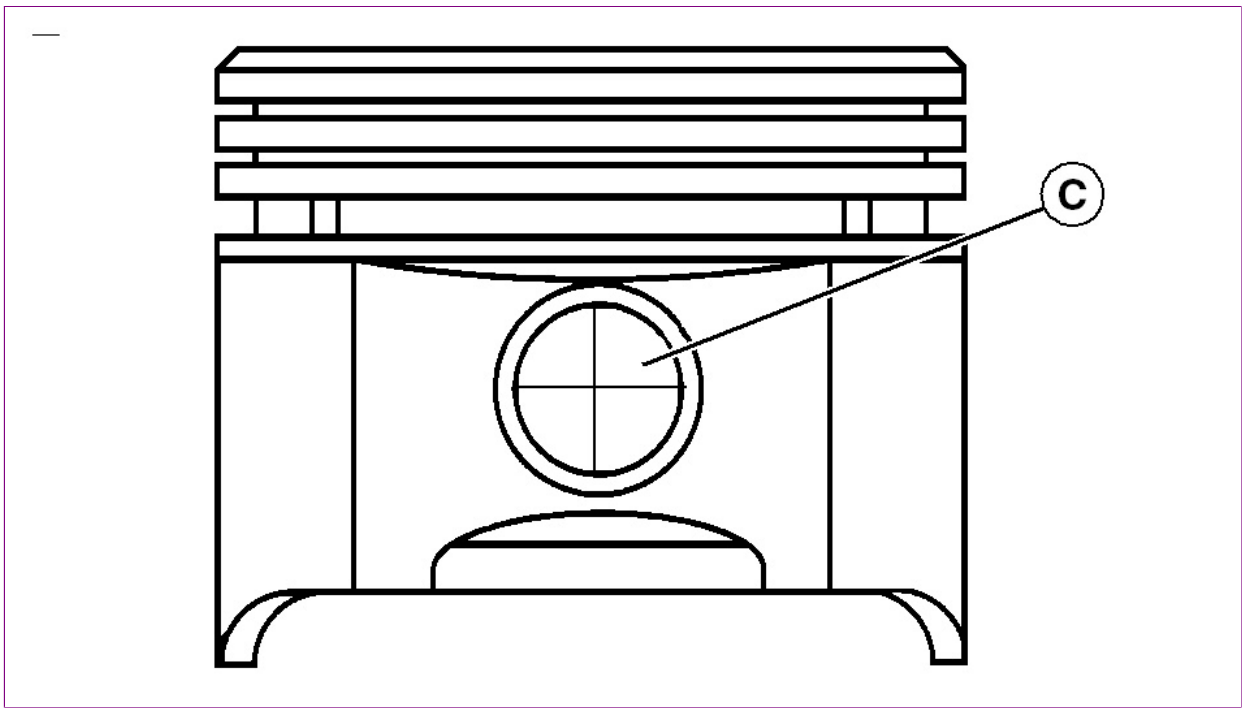
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Connecting Rod Inspection

Connecting Rod Inspection

Procedure:



1. If the crankpin bearing (A) in the connecting rod is scored, replace the rod. Reject sizes of crankpin bearing and piston pin bearing (B) are at the end of this procedure.
2. Replace connecting rod if either bearing is worn.



3. Measure piston pin and piston pin bore (C).
4. Reject sizes for piston pin and piston pin bore are at the end of this procedure.
5. If piston pin is worn **0.01 mm (0.001 in.)** out of round or below reject size, it must be replaced.

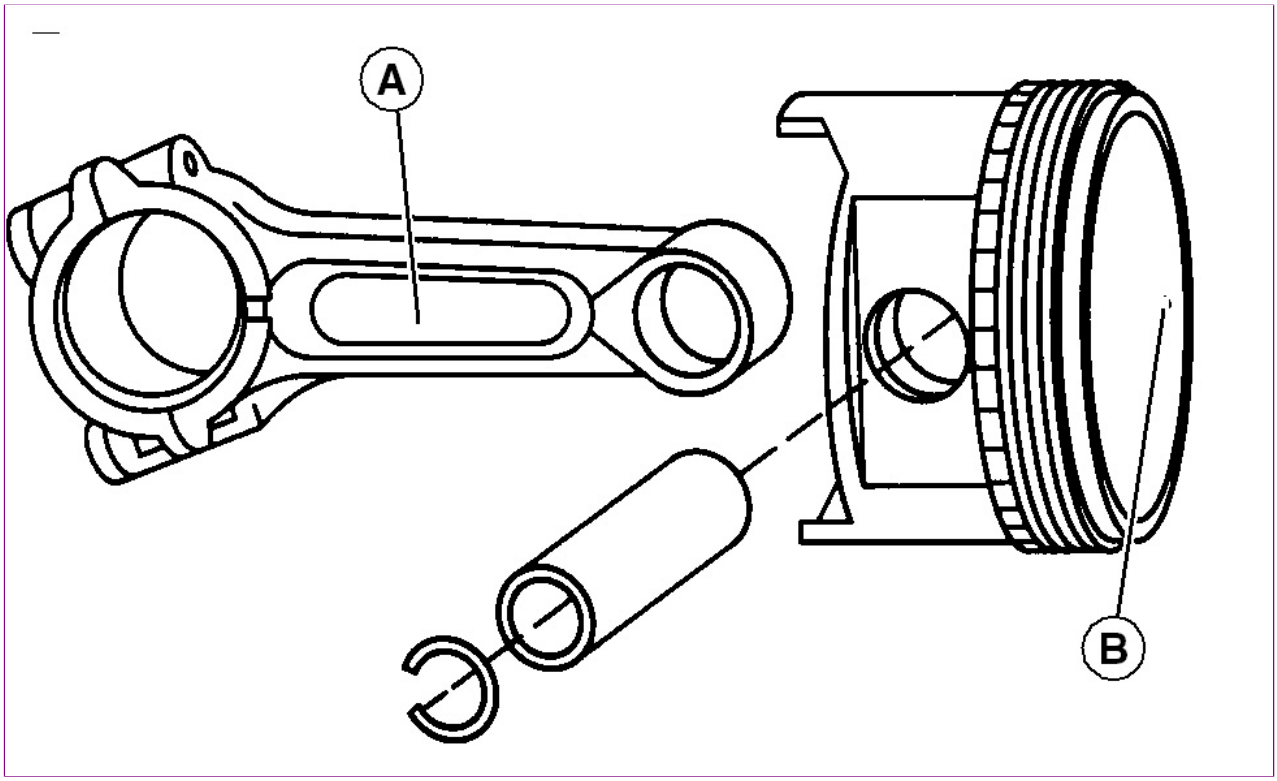
Item	Measurement	Specification
Wear Limit Specifications:		

Crankpin Bearing	38.15 mm 1.502 in.)
Piston Pin Bearing	17.15 mm 0.675 in.)
Piston Pin	17.07 mm 0.672 in.)
Piston Pin Bore	17.15 mm 0.675 in.)

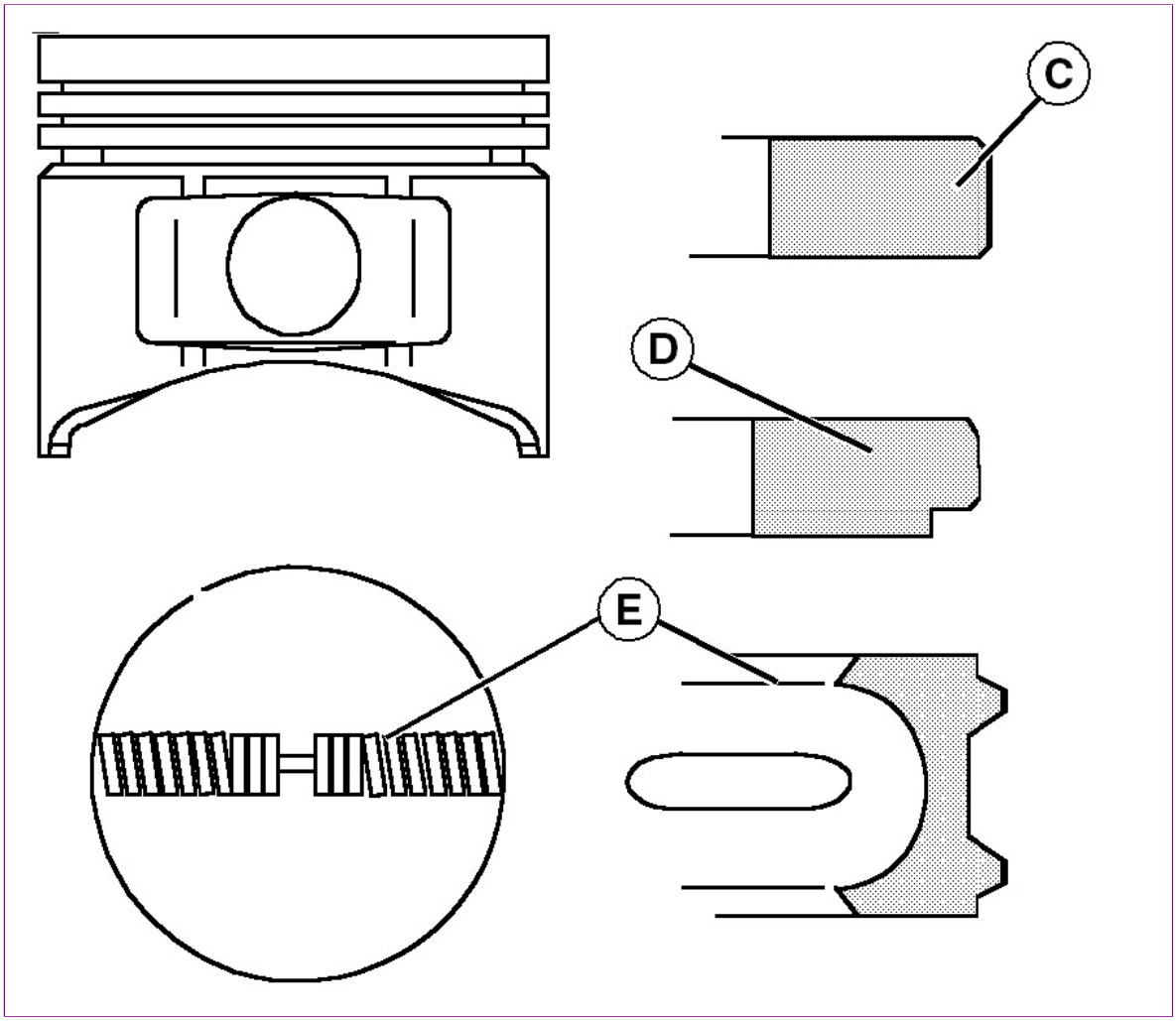
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Assemble Piston and Connecting Rod

Assemble Piston and Connecting Rod

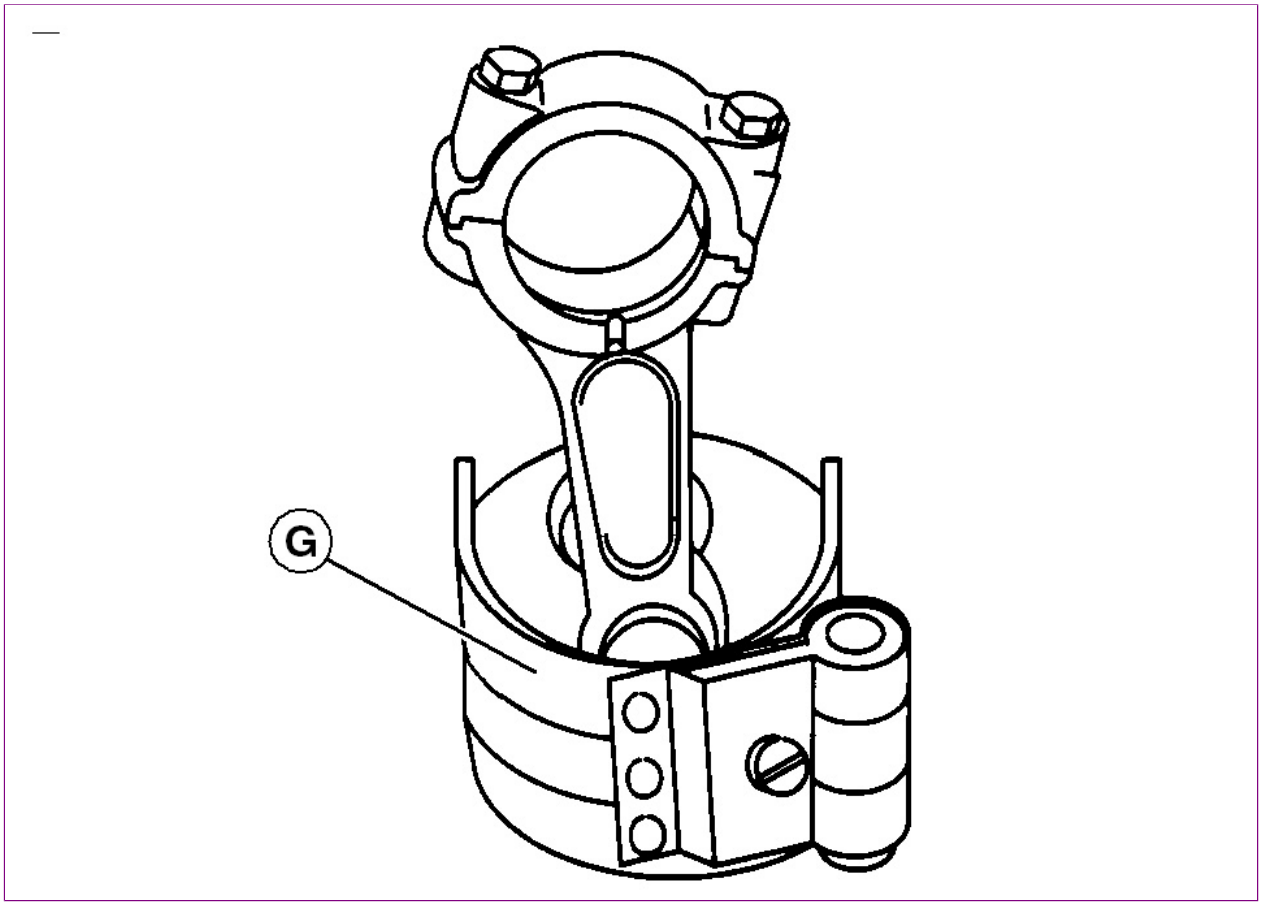
Piston and Rod:



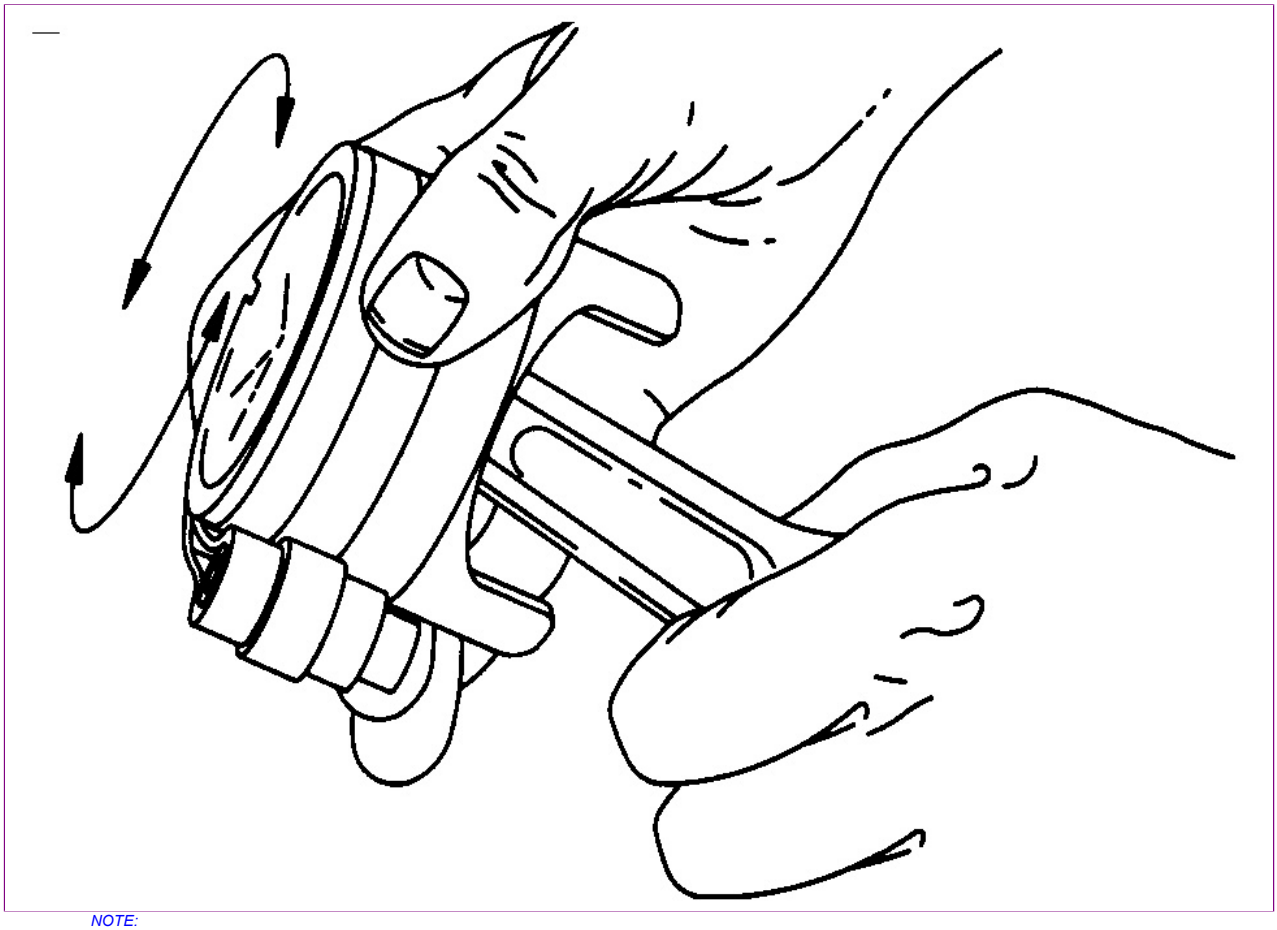
1. The piston pin is a slip fit in both piston and connecting rod. Use a thin nose pliers or screwdriver and install a piston pin lock in the groove on one side of the piston. Refer to above drawing to determine correct location of rod (“Out 1” Cylinder number one, or “Out 2” Cylinder number two) (A) in relation to notch or circle (B) on piston. Insert piston pin from opposite side of piston until pin stops against piston pin lock. Install the other piston pin lock. Be sure both locks are seated in grooves.



2. The correct piston ring positions are shown above. The oil ring is installed with the expander (E) between the two oil control rings. The top and second compression rings are installed with "I.D." mark toward top of piston (B).
3. Install expander first. Spiral the bottom oil control ring into top ring groove, then into second ring groove and into position below the expander. Repeat procedure to place top oil control ring above the expander.
4. Using ring expander, install center compression ring (taper face) (D) then, top compression ring (barrel face) (C) as shown above.

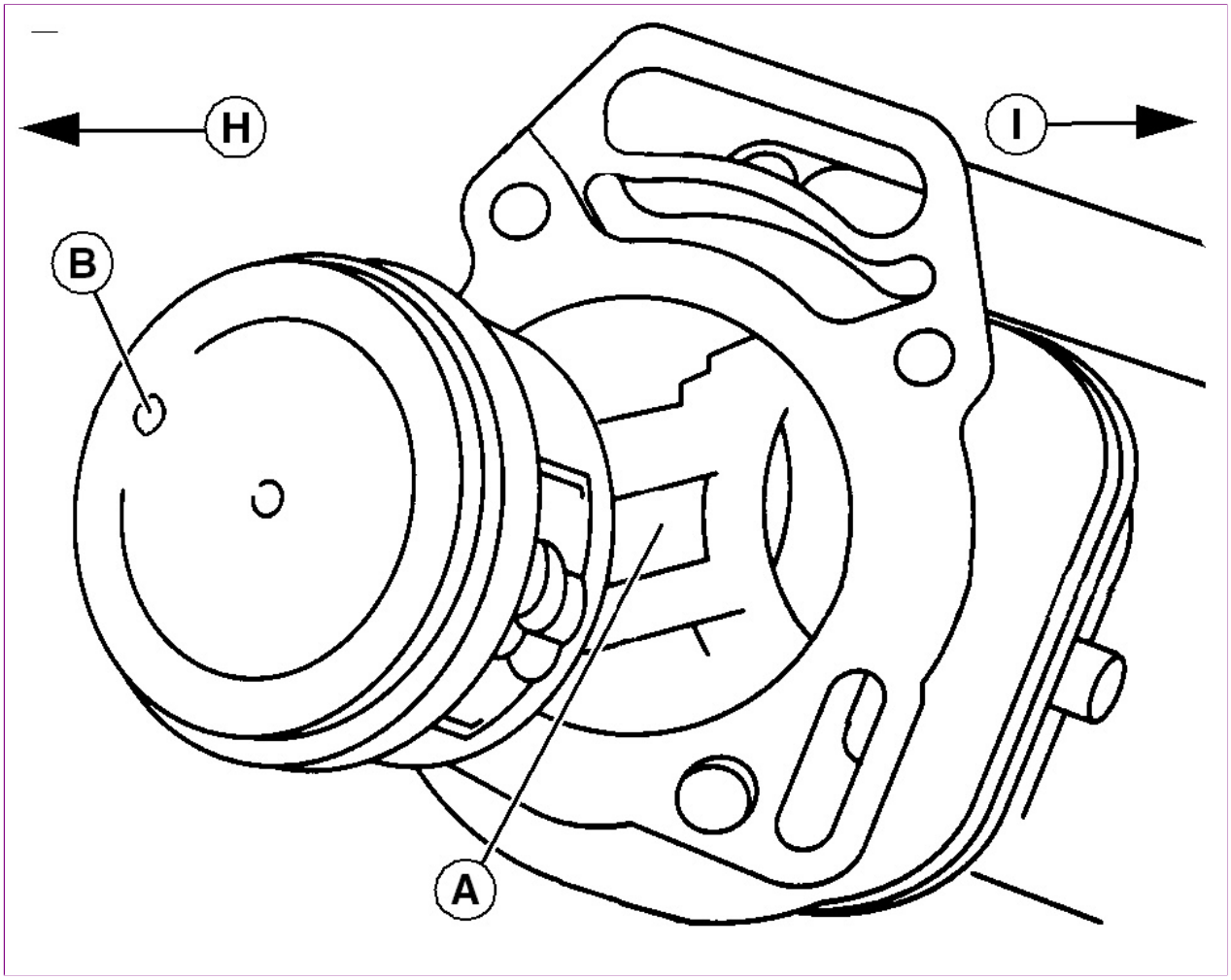


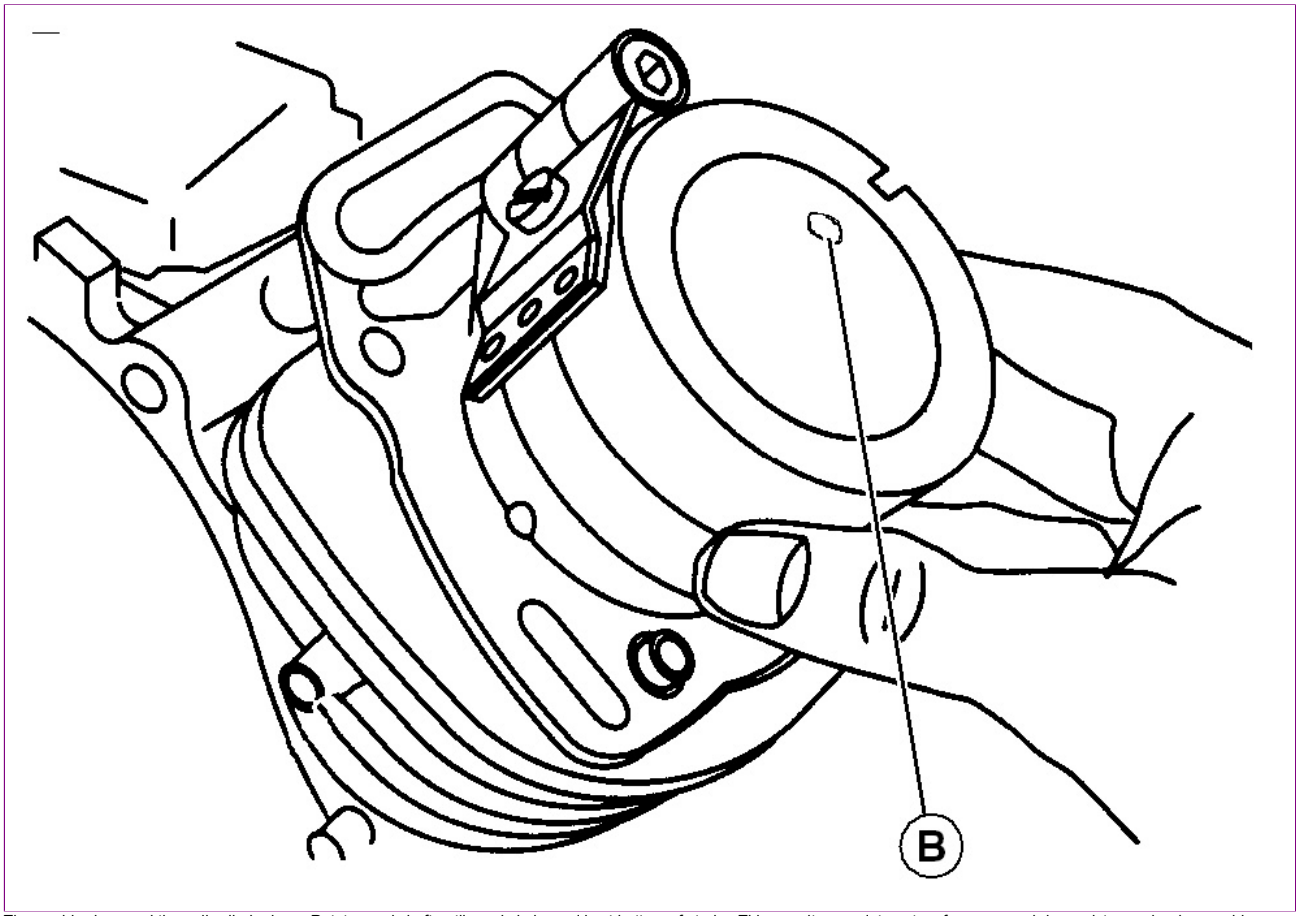
5. Apply oil to piston rings and piston skirt. Compress rings with ring compressor (G). Place piston and ring compressor upside down on bench and push down until head of piston and edge of ring compressor are even. Tighten ring compressor until rings are fully compressed. Then loosen ring compressor very slightly so that compressor can be rotated on piston skirt while holding connecting rod.



6. *NOTE:*

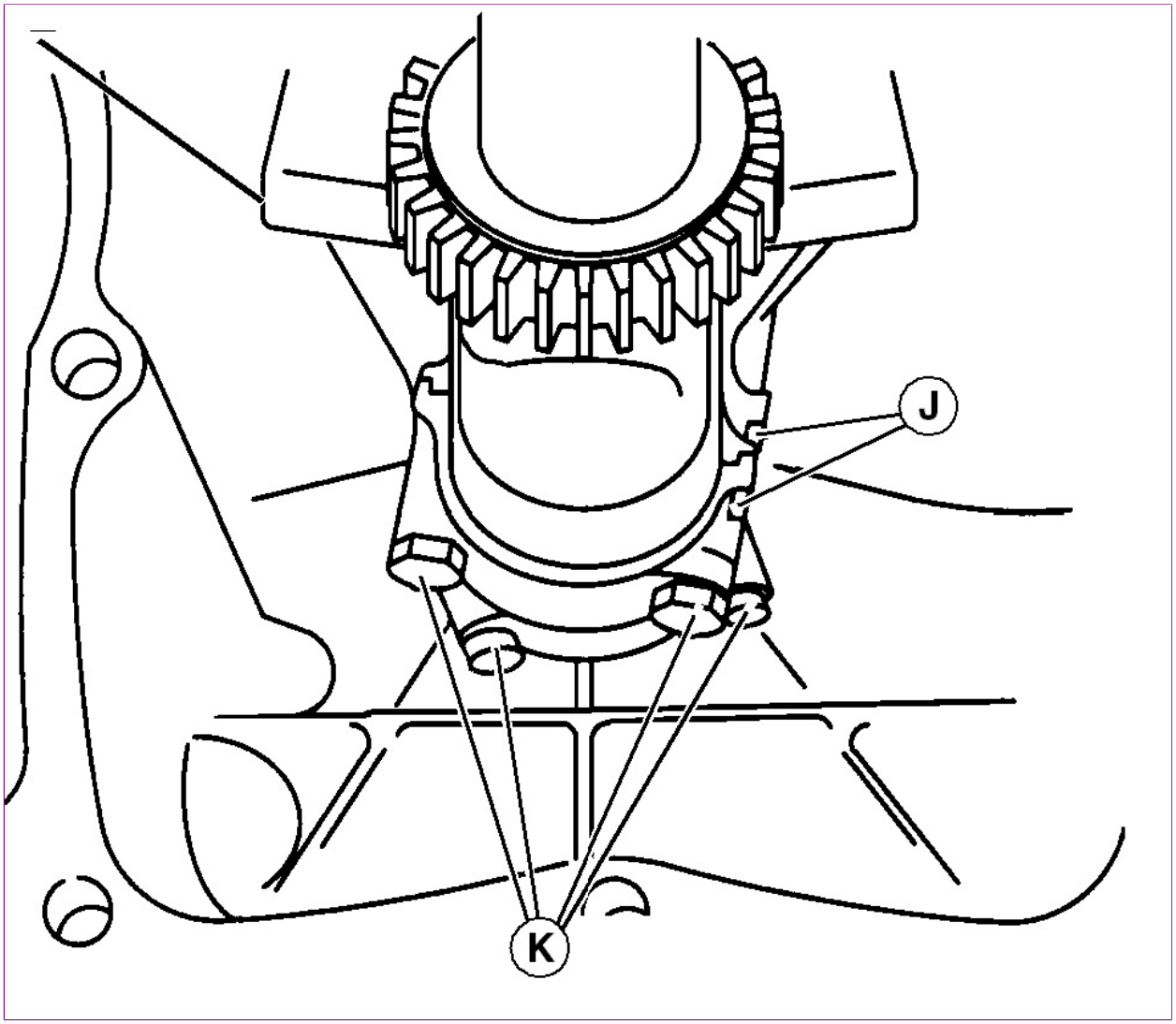
The pistons have offset piston pin bores. When the circle (B, Figure 88927) on piston is facing toward the flywheel side (H, Figure 88931) of engine, the words “OUT-1” on the side of the connecting rod for cylinder No. 1 and “OUT-2” on the side of the connecting rod for cylinder No. 2 (A) should face toward the PTO side (I) of the crankcase.


H
I
B
A



Thoroughly clean and then oil cylinder bore. Rotate crankshaft until crankpin journal is at bottom of stroke. This permits complete entry of compressed rings, piston and rod assembly, when pushed into cylinder. If other piston and rod assembly was removed, repeat procedure for that cylinder.

7. Clean and oil crankshaft crankpin.
8. Pull connecting rod against crankpin.



9. Install rod cap with match marks (J) aligned.
10. *NOTE:*

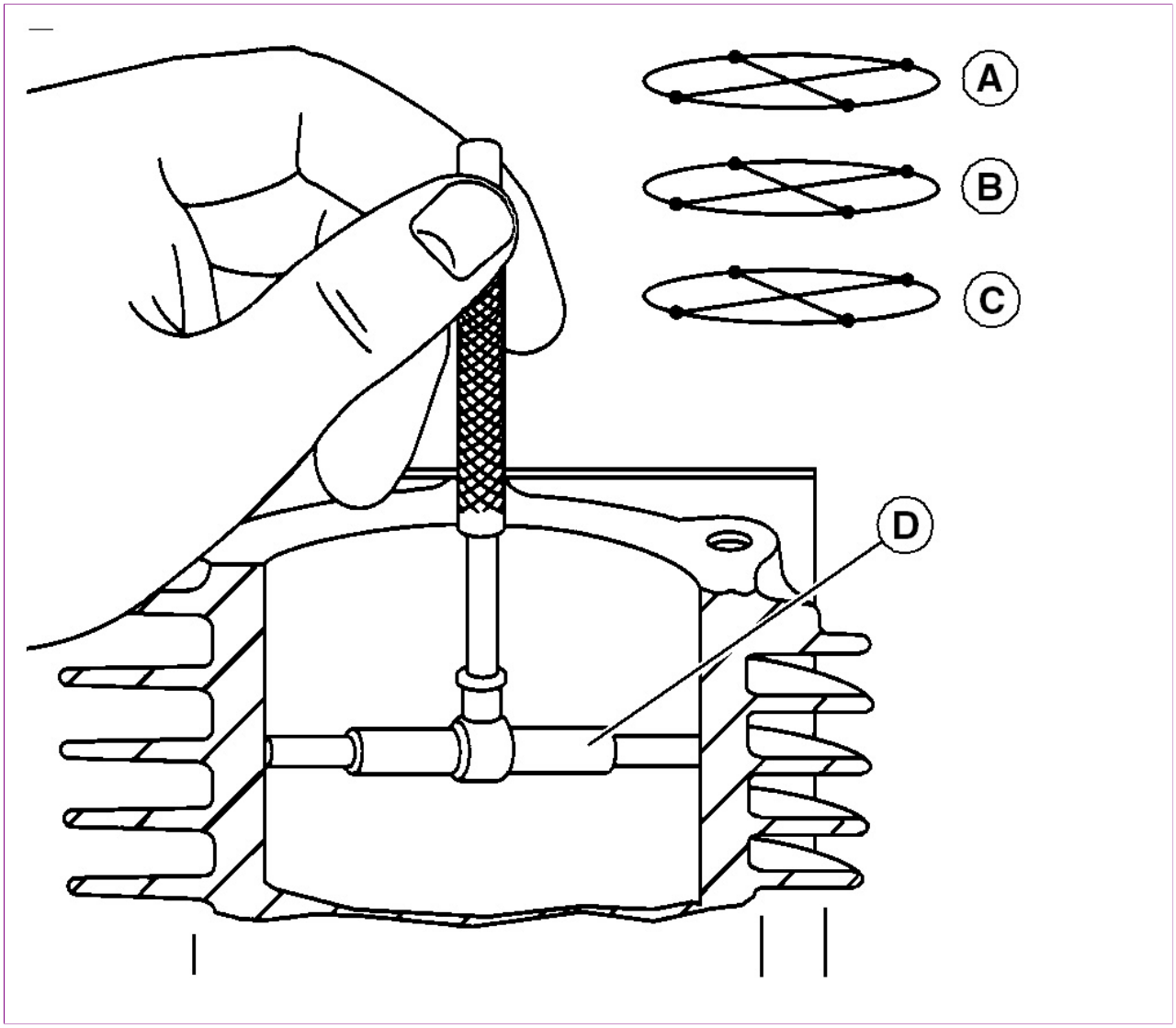
    Failure to use a torque wrench can result in loose connecting rods causing breakage, or overtightened connecting rods causing scoring.

    Install connecting rod screws (K). Tighten to specification.
11. Rotate crankshaft two revolutions to check for binding. Rod should also be free to slide sideways on crankpin.

Item	Measurement	Specification
Specification:		
Connecting Rod Screws		11 N•m 100 lb-in.)

Cylinder Bore Inspection

Procedure:



1. Inspect cylinder after engine has been disassembled. Visual inspection will show if there are any cracks, stripped bolt holes, broken fins or if the cylinder walls are damaged. Use a telescoping gauge (D), and dial caliper, or an inside micrometer to determine the size of the cylinder bore. Measure at right angles and at six locations from the top (A), middle (B) and bottom (C).
2. If the cylinder bore is more than **0.08 mm (0.003 in.)** oversize, or **0.04 mm (0.002 in.)** out of round, it must be resized or replaced.
3. If cylinder bores are within specification and show no signs of scoring or other damage, new pistons rings may be installed providing the cylinder bores are reconditioned to restore the proper cross hatch angle. The proper cylinder cross hatch ensures proper lubrication and piston ring rotation. See Cylinder Bore Honing .

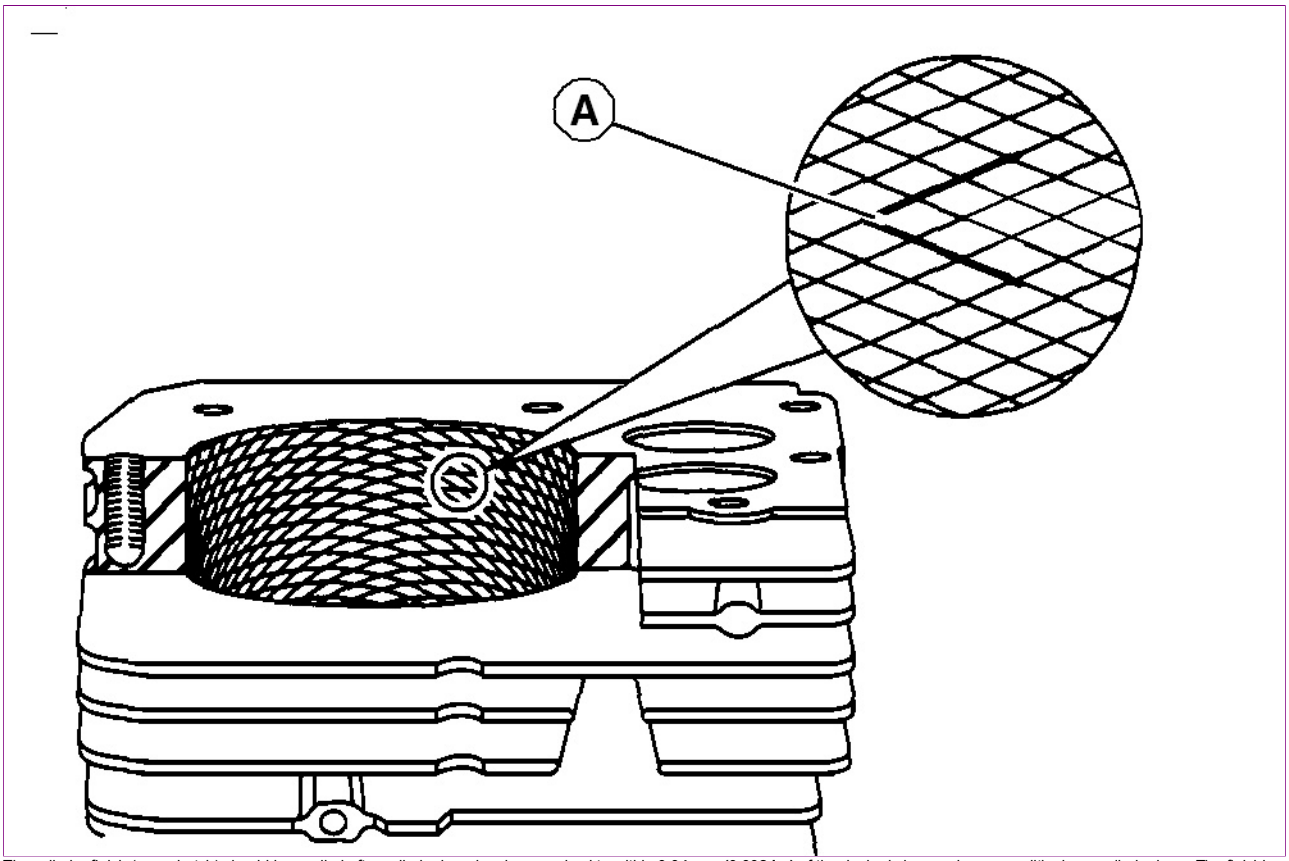
Item	Measurement	Specification
Specifications:		
Standard Bore Size		79.23 - 79.25 mm 3.119 - 3.120 in.)
Standard Bore (maximum)		79.35 mm 3.124 in.)
Cylinder Out of Round (maximum)		0.076 mm 0.003 in.)

Cylinder Bore Honing

Procedure:

1. *NOTE:*

   To produce the proper cross hatch finish use a drill speed of approximately 200 rpm and 40 - 60 strokes per minute. Lubricate hone liberally to prevent build up on finishing stones.



   The cylinder finish (cross hatch) should be applied after cylinder bore has been resized to within **0.04 mm (0.002 in.)** of the desired size or when reconditioning a cylinder bore. The finishing stones will produce the cross hatch necessary for proper lubrication and piston ring rotation. The correct hatch angle is approximately 45 (A).
2. Recondition the cylinder bores to restore the cross hatch when new piston rings are to be installed in a cylinder that is within specification. Be careful not to hone oversize or it will be necessary to resize the cylinder.

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Cylinder Bore Cleaning

Cylinder Bore Cleaning

IMPORTANT:

Ensure that the entire cylinder and crankcase are thoroughly cleaned after honing. First wash the cylinder and crankcase carefully in a solvent such as kerosene. Then thoroughly wash cylinder and crankcase using a stiff brush with soap and hot water, Rinse thoroughly with hot running water. Repeat washing and rinsing until all traces of honing grit are gone. Honing grit is highly abrasive and will cause rapid wear to all of the internal components of the engine unless it is completely removed.

Procedure:

1. When cylinder and crankcase have been thoroughly cleaned, use a clean white rag or napkin and wipe the cylinder bore. If honing grit is present it will appear as a gray residue on rag. If any honing grit is evident, re-wash and rinse entire cylinder and crankcase and check again. When there is no trace of honing grit on rag, the cylinder is properly cleaned. Then oil cylinder bore to prevent rusting.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Resizing Cylinder Bore

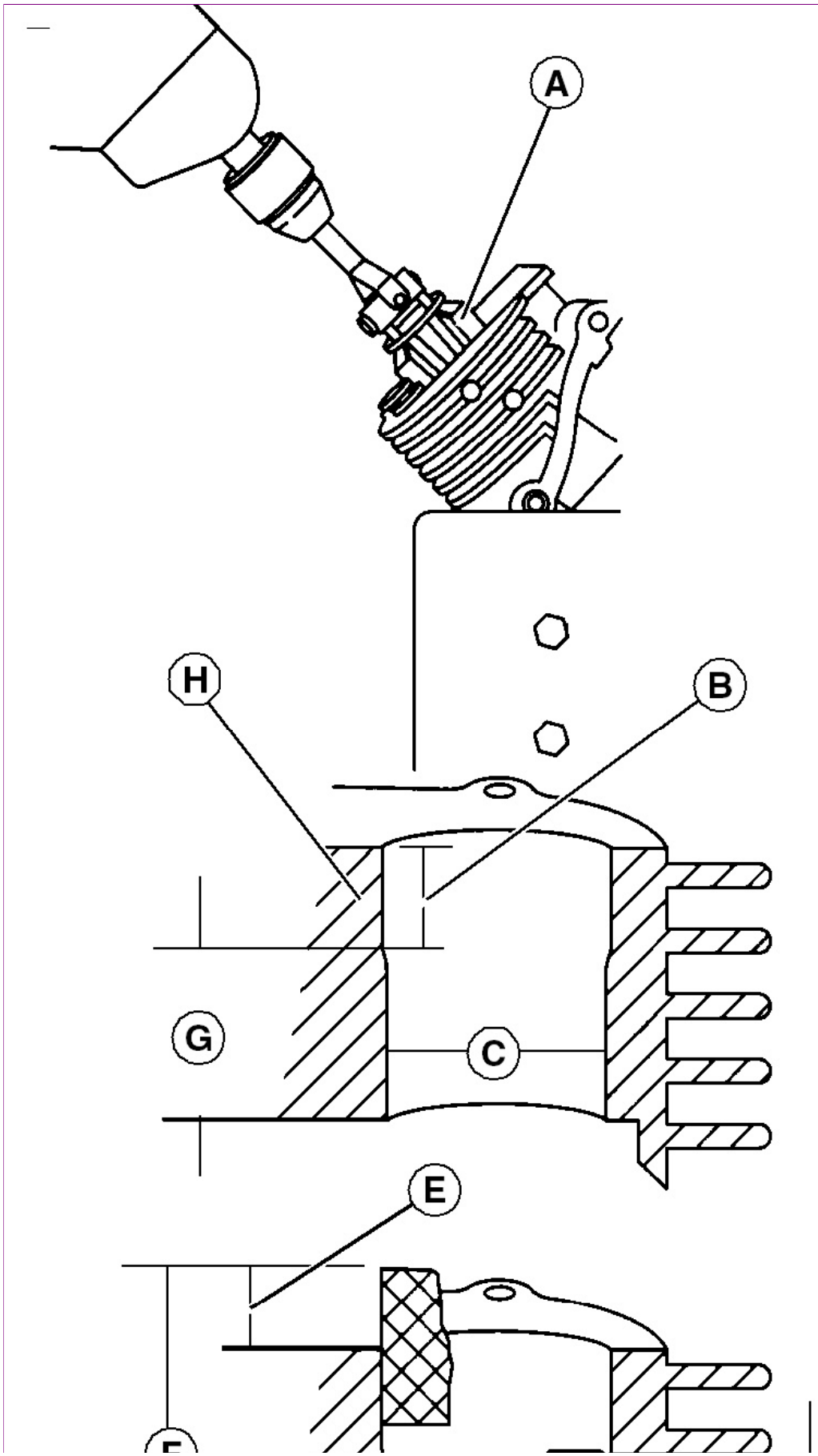
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Resizing Cylinder Bore

Procedure:

1. If the cylinder bore is not within specifications, it will have to be resized using a boring bar or hone. Always resize to exactly **0.51 mm (0.020 in.)** over standard size.
2. If this is done accurately, the service oversize rings and pistons will fit correctly and proper clearances will be maintained.
3. **IMPORTANT:**

   If a boring bar is used, a hone must be used after the boring operation to produce the proper cylinder cross hatch. See “Cylinder Bore Honing” above.


A
H
B
G
C
E
F

If a hone is used to resize the cylinder bore, place hone (A) in middle of cylinder bore (C). Tighten adjusting knob with finger until stones fit snugly against cylinder wall. DO NOT FORCE.

4. Connect drive shaft to hone. Be sure that cylinder and hone are centered and aligned with drive shaft and drill spindle. Lubricate hone as recommended by hone manufacturer.
5. The recommended drill speed is 300 to 700 rpm maximum and 40 - 60 strokes per minute.
6. Because cylinder bores normally wear (H) only in the area of ring travel (B), the cylinder bore will be round above and below ring travel (G).
7. Start drill and, as hone spins, move it up and down at the bottom of the cylinder bore (D).
8. Gradually increase the length of the strokes until hone travels full length of cylinder bore (F). Do not travel more than **19.05 mm (0.750 in.) to 25.4 mm (1.0 in.)** above cylinder bore (E).
9. Lubricate hone frequently to prevent build up on stones.
10. As cutting tension decreases, stop hone and tighten adjusting knob following hone manufacturer's recommendations.
11. Check cylinder bore size frequently.
12. Check cylinder bores at top and bottom for burrs. Remove burrs. Cylinder head and crankcase cover surfaces must be free of burrs and gasket material.
13. After cylinder bore has been brought to proper resizing dimension, a cross hatch must be applied to bore.

Item	Measurement	Specification
Specifications:		
Standard Bore Size		79.25 mm 3.120 in.)
Oversize Bore		79.30 mm 3.122 in.)

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Flywheel Removal and Installation

Flywheel Removal and Installation

Equipment:

- Briggs & Stratton Flywheel Tool (part number 19203)

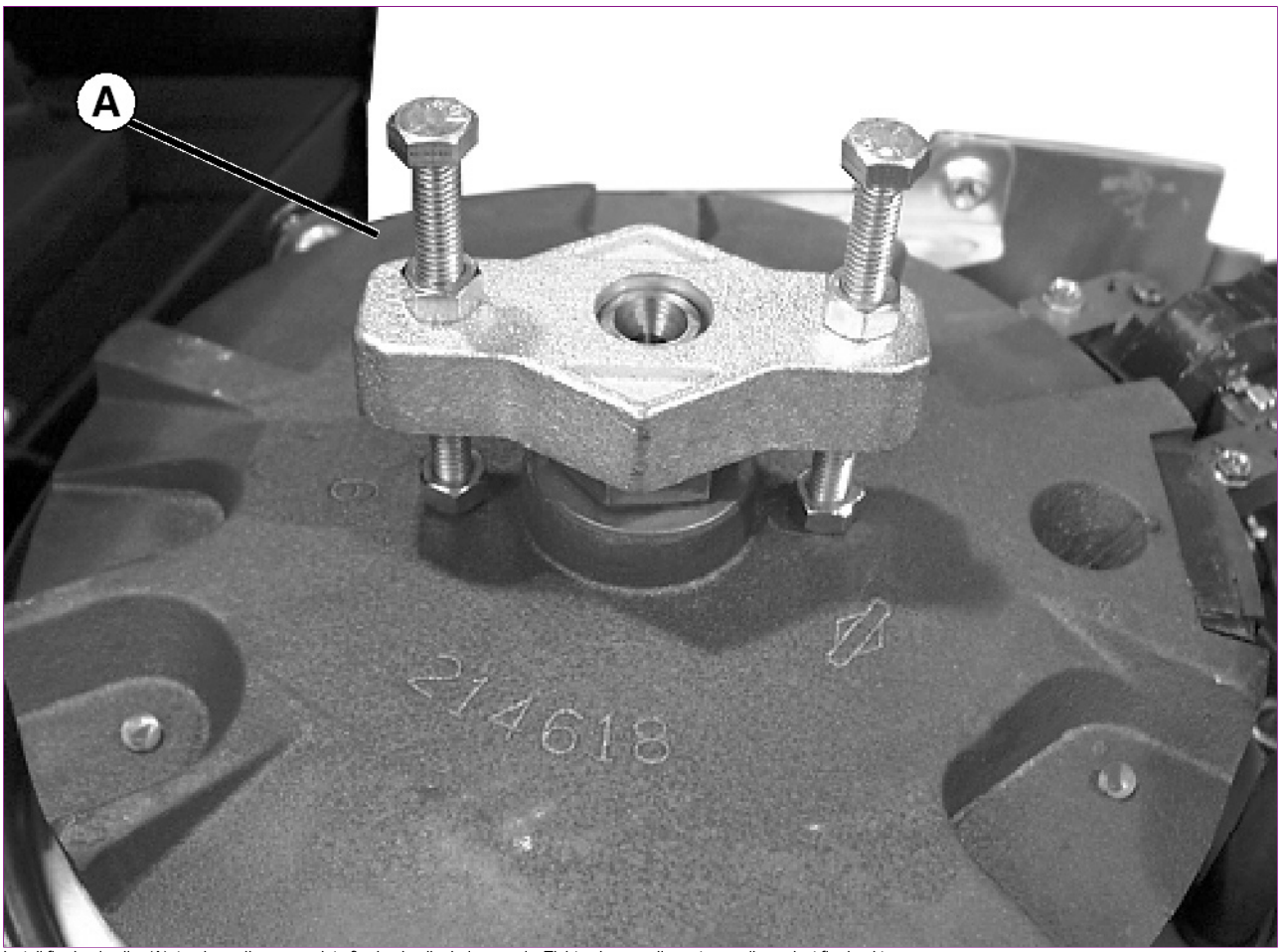
Procedure:

1. Remove blower housing and rotating screen.
2. Remove two screws securing fan. Remove fan
3. Loosen ignition coil screws and move ignition coils away from flywheel, or remove ignition coils completely.
4. *NOTE:*

   If the engine crankshaft rotates while loosening the flywheel nut, secure the flywheel with a strap wrench.

   Use an impact wrench and 32 mm (1-1/4 in.) socket to loosen flywheel nut. Do not remove at this time.
5. Unscrew nut until it extends just beyond engine input shaft threads.
6. **IMPORTANT:**

   Do not use a flywheel puller that pulls against flywheel teeth.



   Install flywheel puller (A), turning puller screws into flywheel puller holes evenly. Tighten lower puller nuts equally against flywheel to secure screws.
7. Tighten upper puller nuts to press puller against flywheel nut until flywheel separates from engine input shaft.
8. Remove puller, flywheel nut, washer and flywheel.
9. Inspect flywheel for cracks, broken fins, burrs on the taper or keyway and distortion of the keyway. Check taper of crankshaft for burrs, rust or other damage. Replace crankshaft if damaged.
10. Inspect flywheel key for wear or damage. Replace if necessary.
11. ---

    CAUTION:

    Improperly installed flywheel can cause machine damage and serious personal injury

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    Before installing flywheel, clean taper and crankshaft taper removing all oil, dirt or grease.
12. Align keyway. Install key and flywheel.

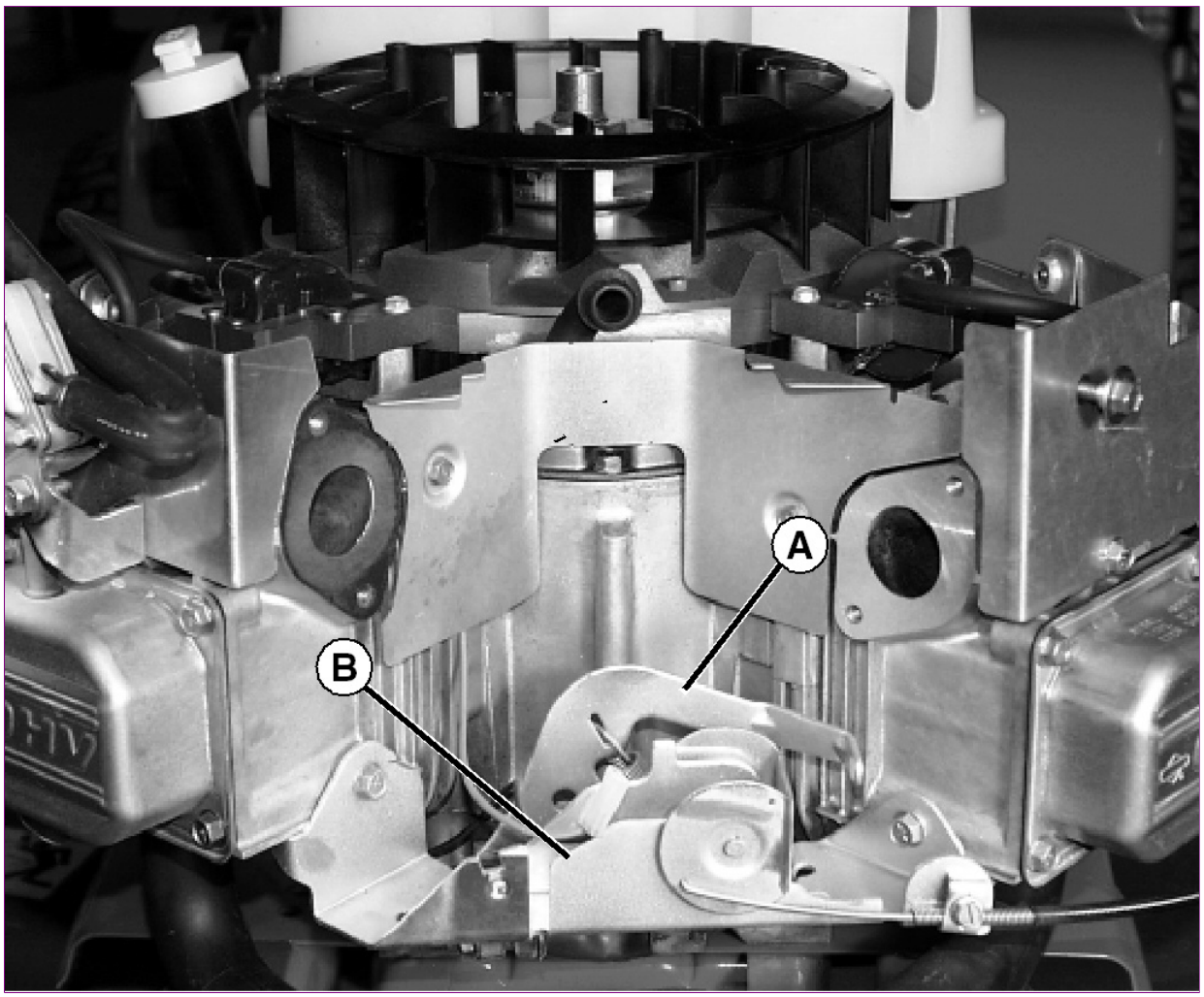
13. Install flywheel nut.
14. Place strap wrench on flywheel. While holding flywheel, tighten flywheel nut to specification.
15. Install fan and secure with two screws.

Item	Measurement	Specification
Specifications:		
Fan Retainer Cap Screws		16 N•m 140 lb-in.)
Flywheel Nut		203 N•m 150 lb-ft)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Crankshaft and Camshaft Removal, Inspection and Installation

Crankshaft and Camshaft Removal, Inspection and Installation

Removal:

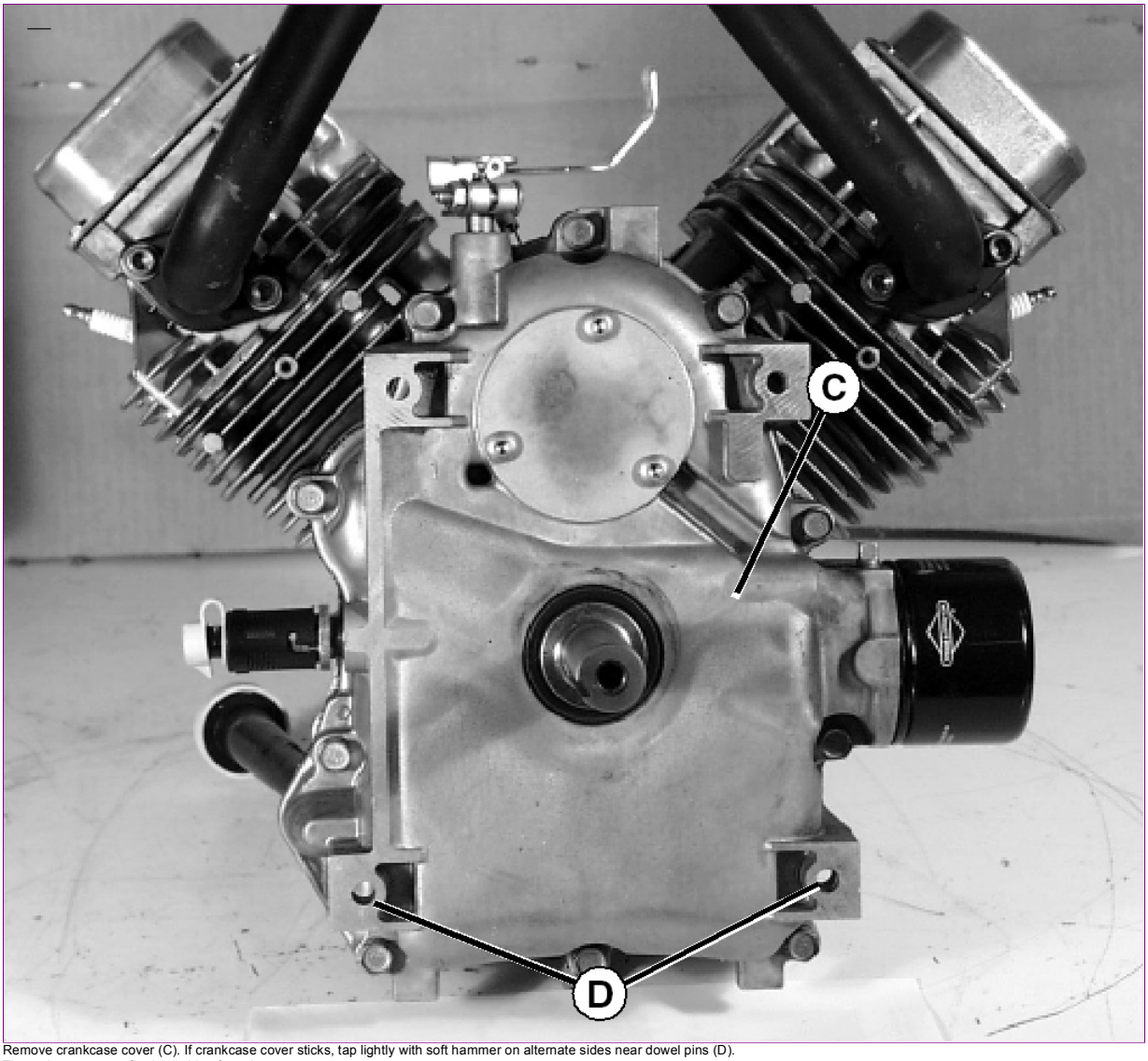


1. Remove governor lever (A) and disconnect governor link and springs. Remove governor control bracket (B). Remove oil fill tube and dipstick assembly.
2. Remove exhaust manifold, intake manifold and cylinder heads.
3. Remove oil pump. See Oil Pump Removal and Installation .
4. **IMPORTANT:**

   Do not remove dowel pins.

   NOTE:

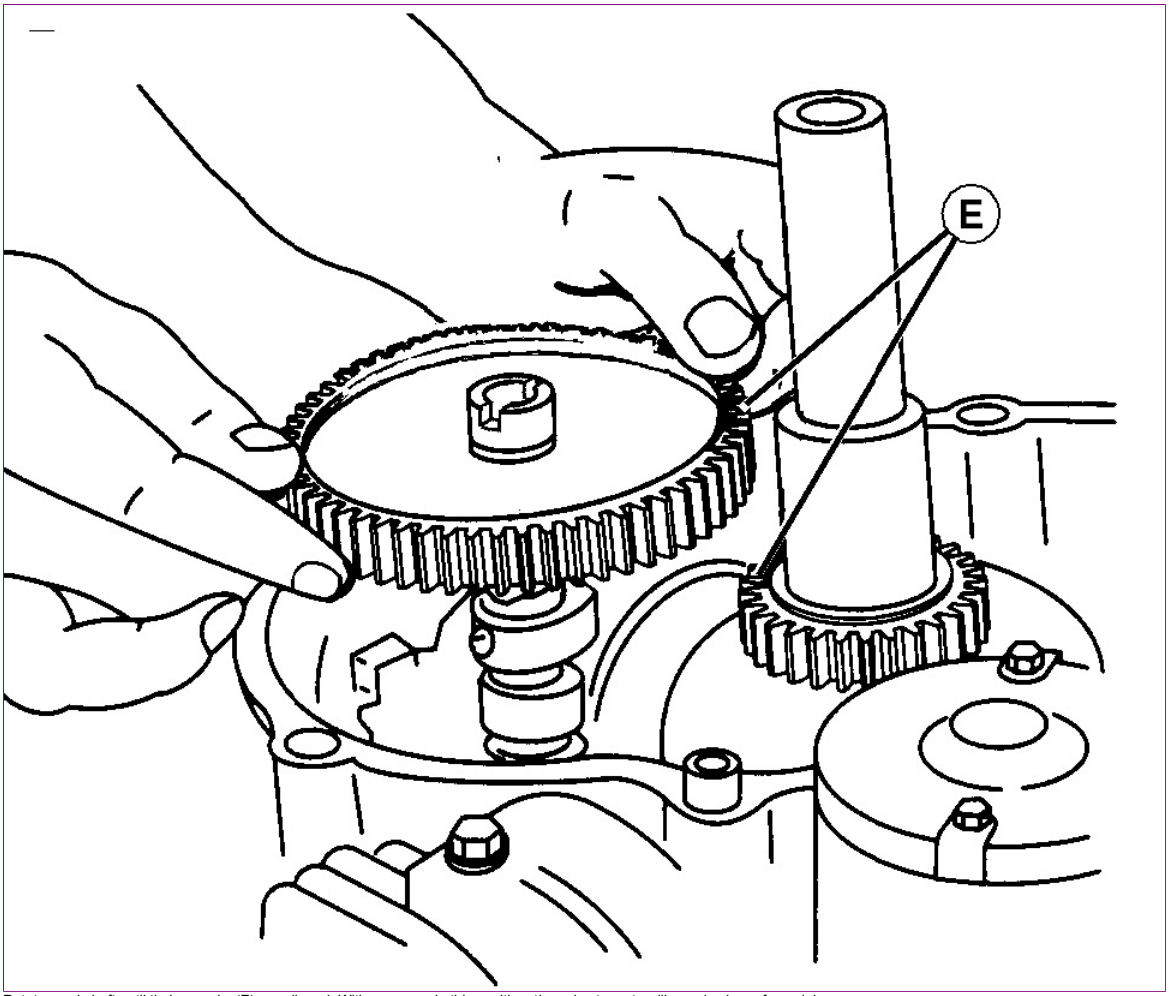
   Remove rust, paint or burrs from the PTO end of the crankshaft before the crankcase cover is removed. This will reduce the chances of damaging the crankcase cover bearing.



Remove crankcase cover (C). If crankcase cover sticks, tap lightly with soft hammer on alternate sides near dowel pins (D).

5. Tip engine over onto flywheel side of crankcase.
6. Support engine to prevent end of crankshaft from resting on workbench.
7. **IMPORTANT:**

   If engine is rotated from this position, tappets will fall out. Tappets must not be mixed.



Rotate crankshaft until timing marks (E) are aligned. With cam gear in this position, the valve tappets will remain clear of cam lobes.

8. Lift out cam gear, governor gear and thrust washer.
9. Mark the connecting rods and caps to prevent interchanging when reassembling.
10. Remove piston and connecting rod assemblies.
11. Remove crankshaft from crankcase.
12. **IMPORTANT:**

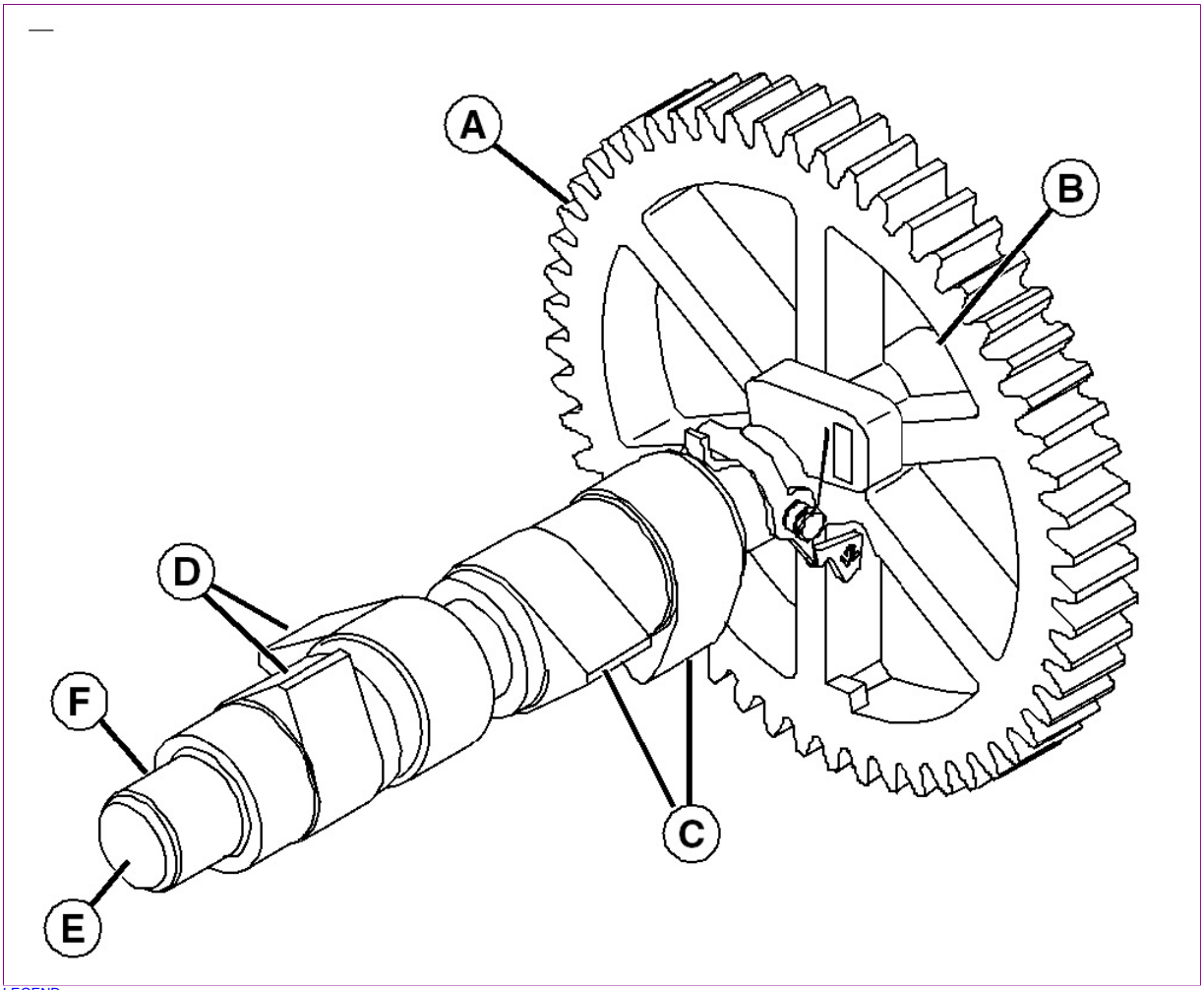
    The various wear points on the crankshaft must be measured.

    Replace crankshaft if worn or if journals are scored. Keyways should be checked to be sure they are not worn or spread. Remove burrs from keyway edges to prevent damaging the bearing or oil seal. Check oil galleries for blockage or obstructions.
13. Check gear teeth for chipped or cracked teeth. Replace if needed.
14. *NOTE:*

    Always replace tappets if the camshaft is replaced. Pre-lubricate tappets and cam lobes with multipurpose grease.

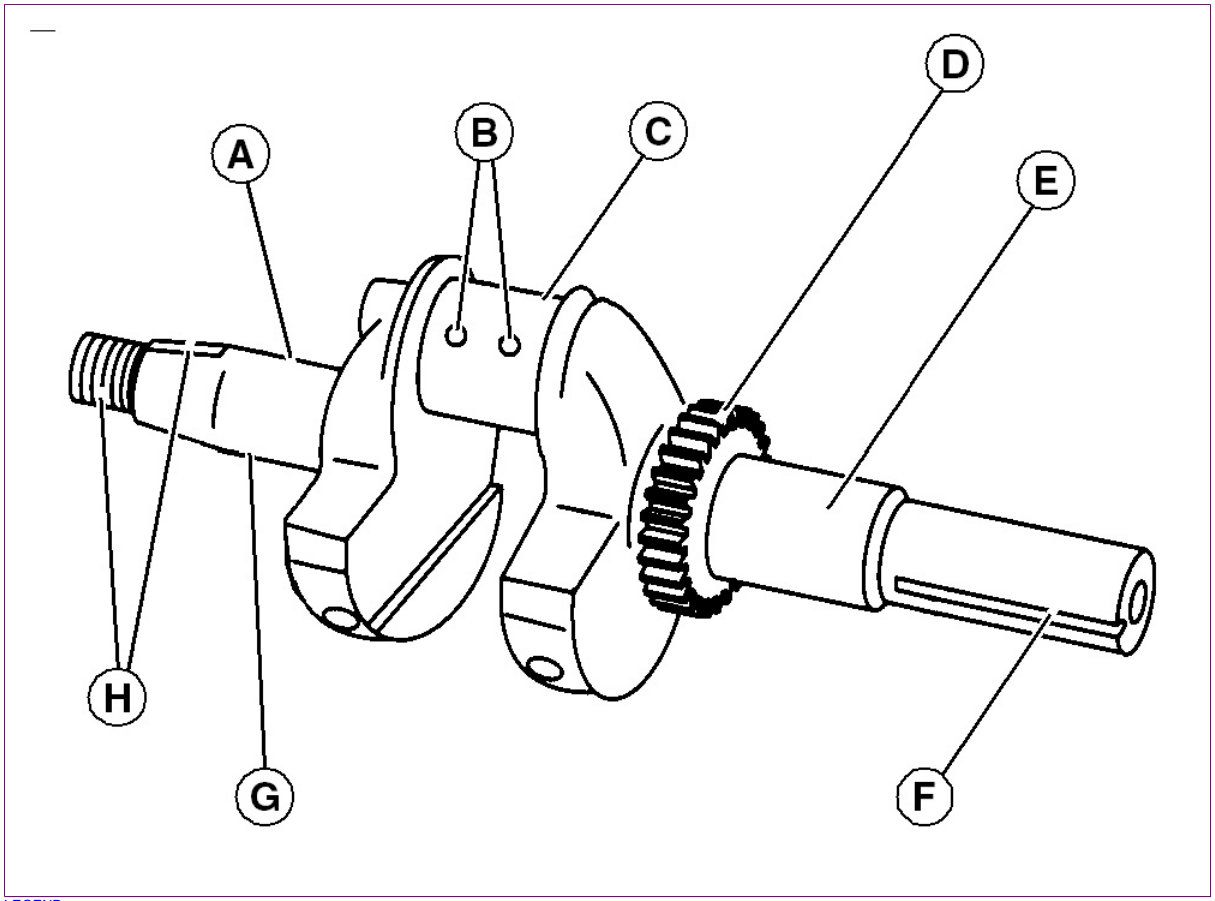
    Inspect cam gear teeth, lobes and journals for wear and nicks. Cam gear journal and lobe reject sizes are below.

Component Location:



LEGEND:

A - Gear Teeth
B - PTO Journal
C - Exhaust Lobes
D - Intake Lobes
E - Oil Gallery
F - Mag. Journal



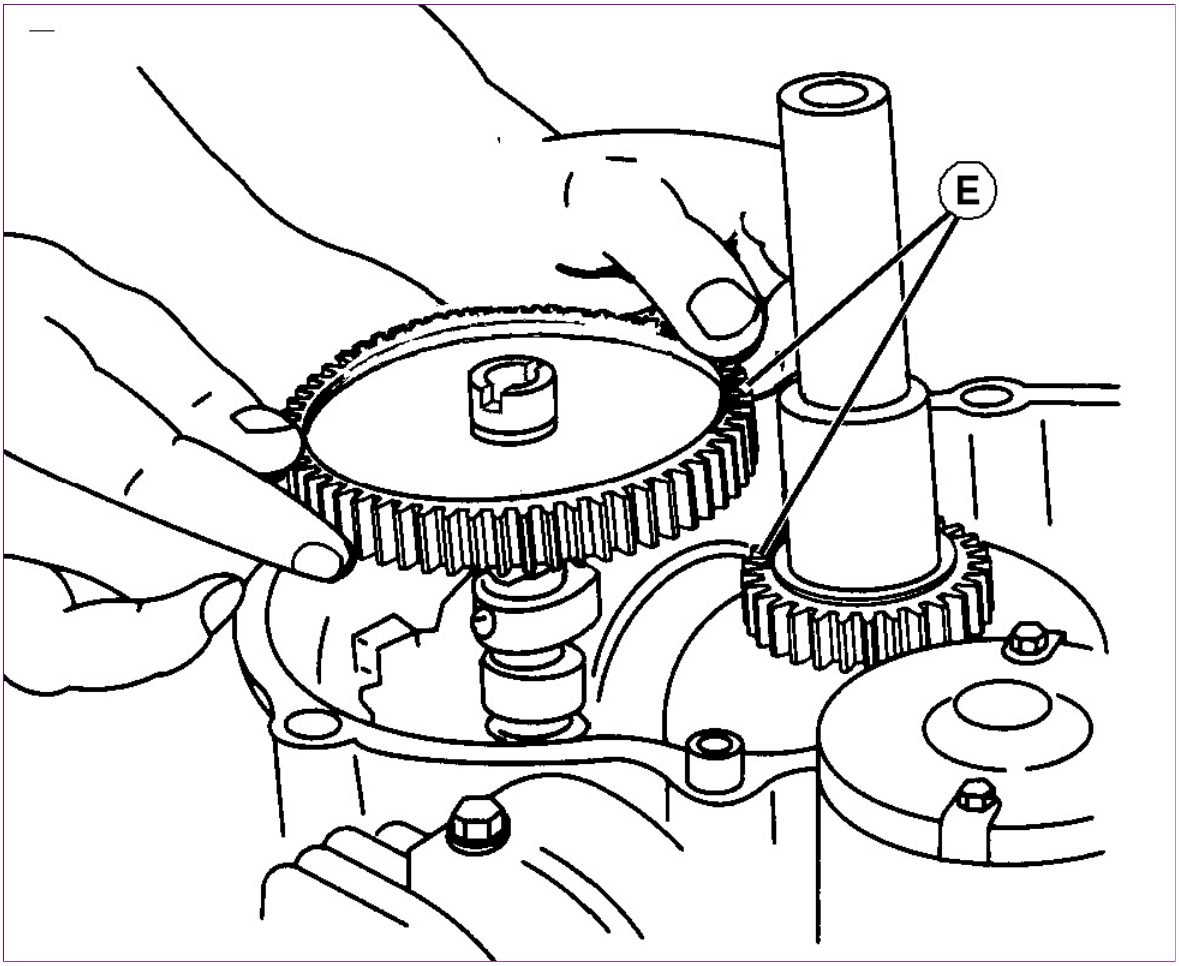
LEGEND:

A - Mag. Journal
B - Oil Galleries
C - Crankpin
D - Timing Gear Teeth
E - PTO Journal
F - Keyway
G - Oil Galleries
H - Threads and Keyway

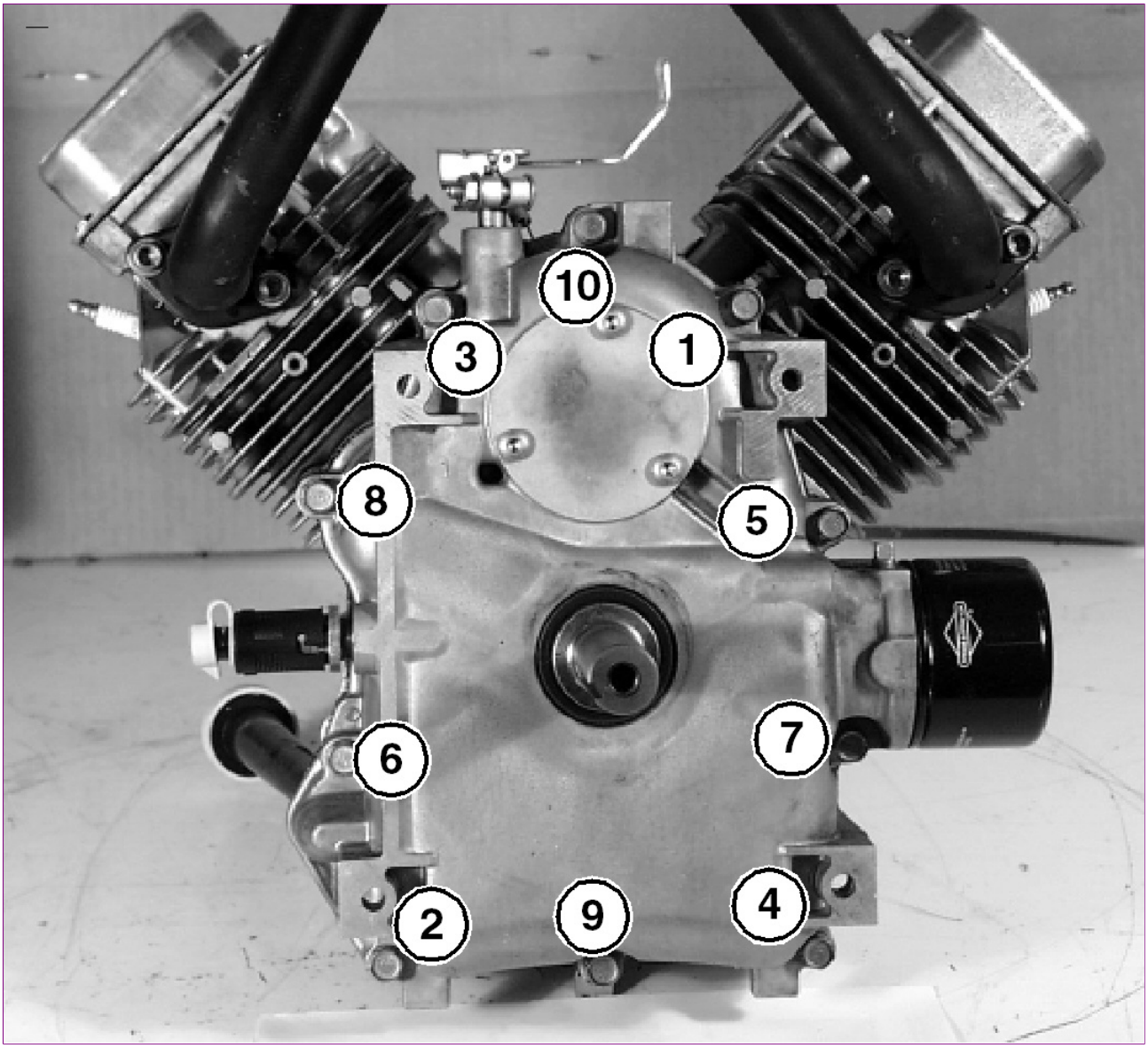
Item	Measurement	Specification
Wear Limit Specifications:		
PTO Journal		41.22 mm 1.623 in.)
Mag. Journal		34.95 mm (1.376 in.)
Crankshaft Crankpin		38.02 mm 1.497 in.)
Crankshaft End Play		0.02 - 0.30 mm 0.001 - 0.012 in.)
Cam Gear PTO journal		12.64 mm 0.498 in.)
Cam Gear Mag. journal		12.64 mm 0.498 in.)
Cam Lobes (Intake)		31.12 mm 1.225 in.)
Cam Lobes (Exhaust)		31.06 mm 1.223 in.)
Torque Specification:		
Crankcase Cover Bolts		22.6 N•m 200 lb-in.)

Installation:

1. Remove any old gasket material from mating surfaces. Place new crankcase cover gasket on crankcase.

2. 

   Install crankshaft and camshaft, aligning timing marks (E) accordingly.
3. Lubricate thrust washer, governor gear and governor cup and install.
4. Install oil pump.
5. Take care to protect the oil seal while assembling crankcase cover. No force should be used.

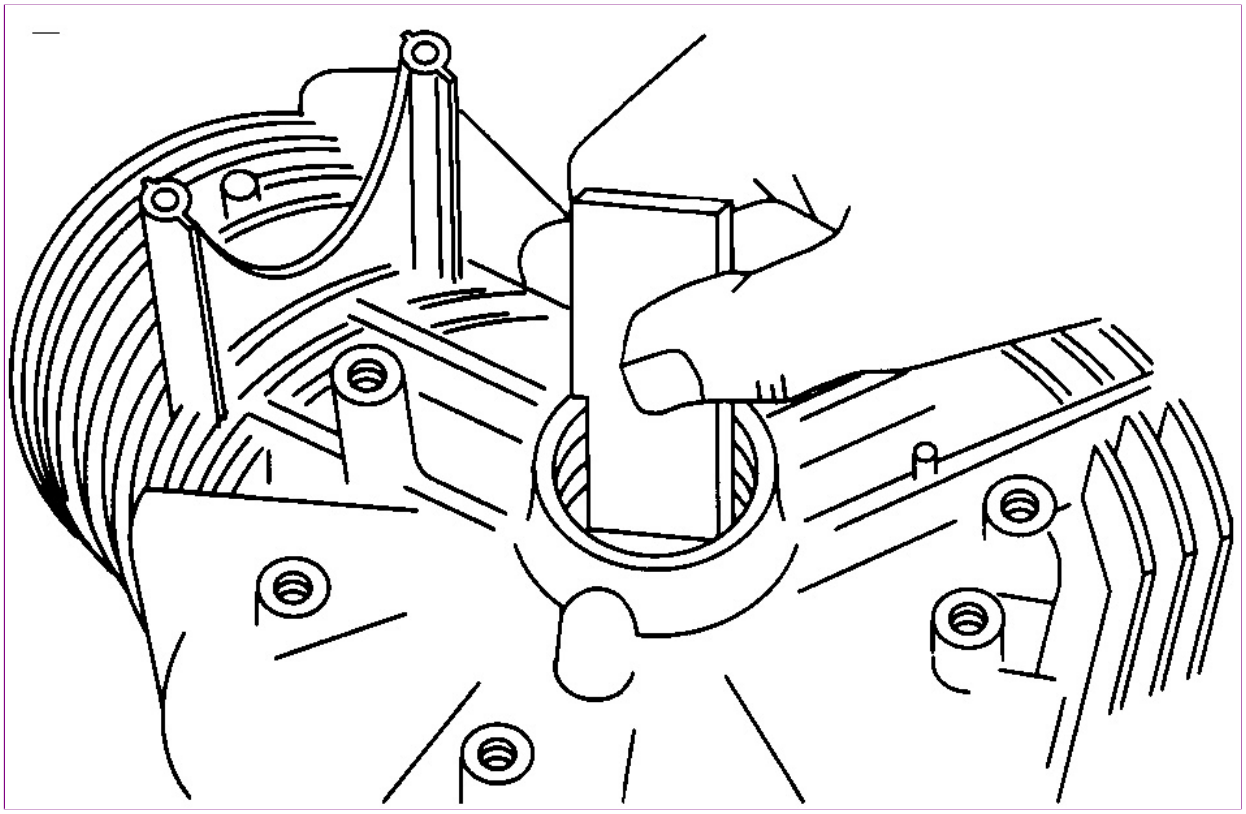
6. 

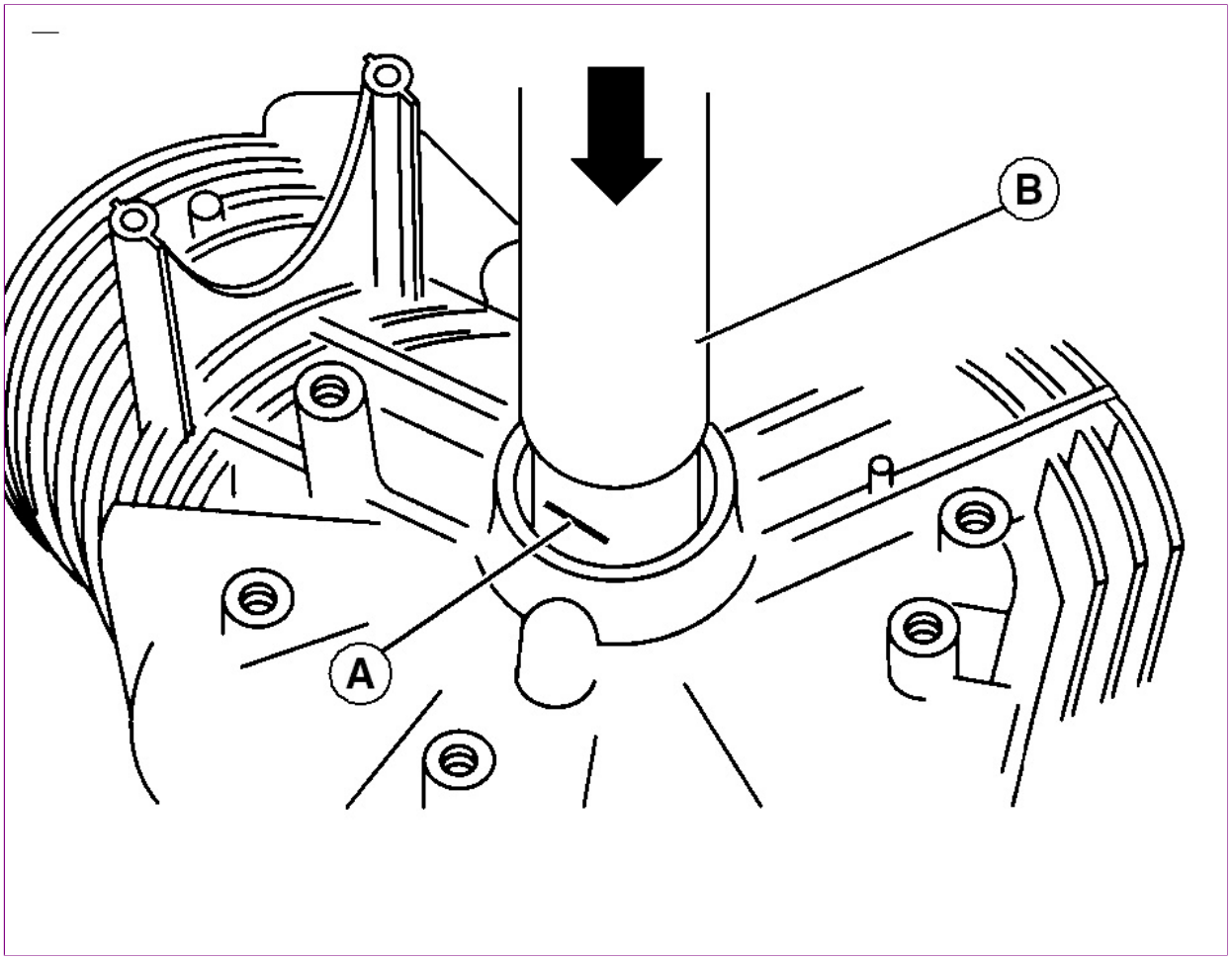
   Tighten cover bolts to specification in the sequence shown above.
7. Install cylinder heads.
8. Install flywheel.
9. Install intake manifold and carburetor assembly.
10. Install governor lever and governor springs.
11. Install oil fill tube and dipstick assembly.
12. Install engine shrouding.
13. Install air cleaner assembly.
14. Perform static and dynamic governor adjustments.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Magneto Bearing Inspection

Magneto Bearing Inspection

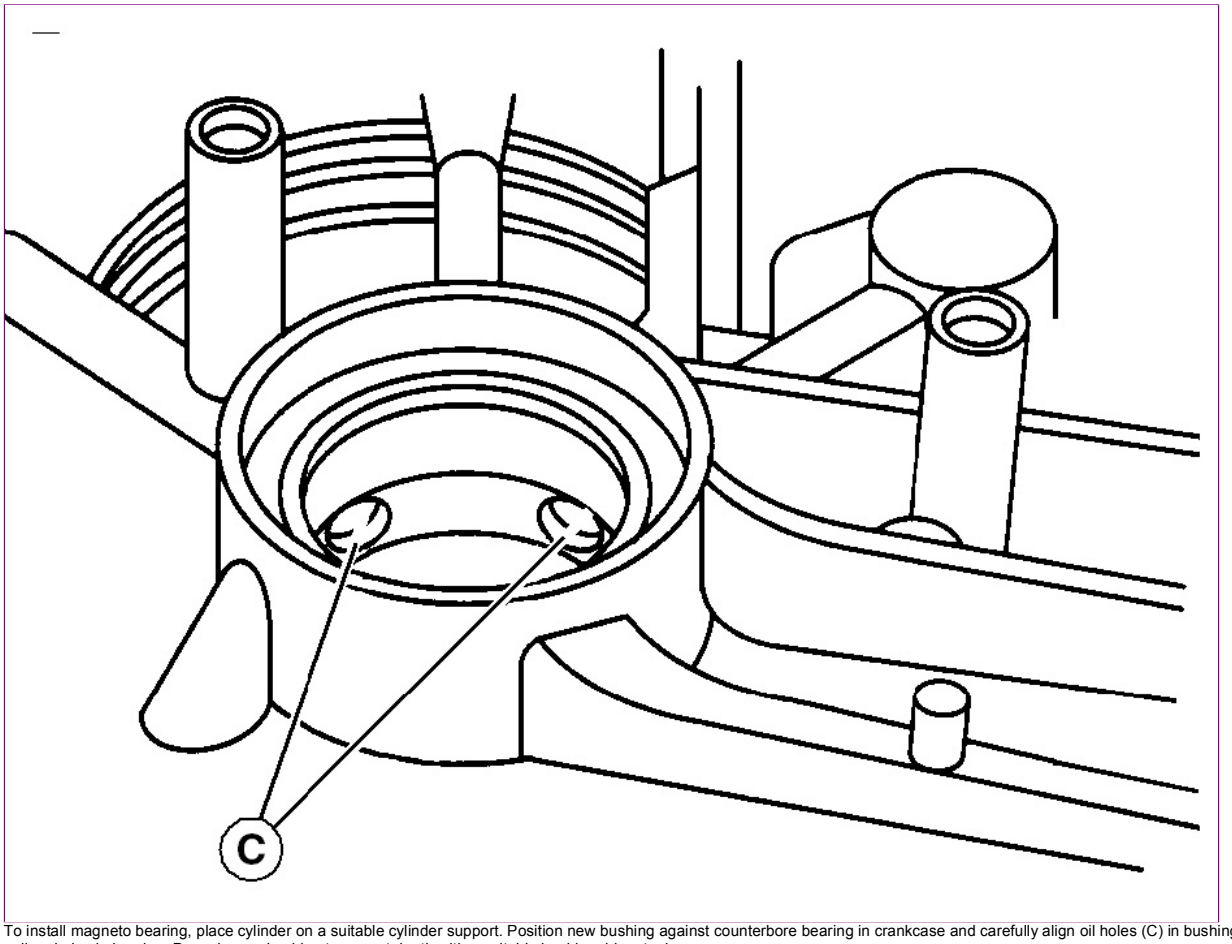
Procedure:

1. 
   Replace the main magneto bearing if scored or not within tolerance.
2. To remove the magneto bearing, first remove oil seal.

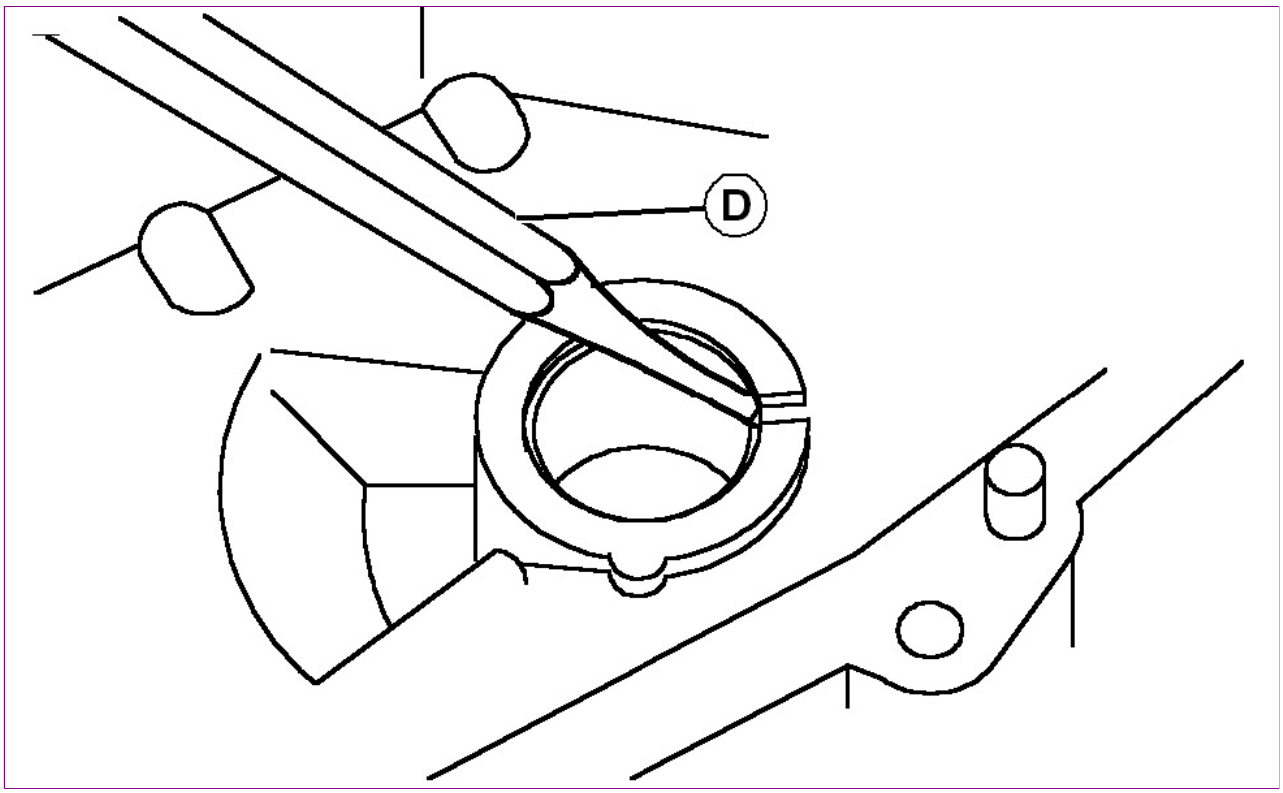


3. To remove magneto bearing, place cylinder on a suitable cylinder support. Insert suitable bushing driver tool (B) and mark (A) tool to indicate proper depth when installing new bushing. Press out old bushing, from oil seal side.
4. *NOTE:*

   Be sure oil holes in bushing are aligned with oil gallery holes in bearing.



To install magneto bearing, place cylinder on a suitable cylinder support. Position new bushing against counterbore bearing in crankcase and carefully align oil holes (C) in bushing with oil gallery holes in bearing. Press in new bushing to correct depth with a suitable bushing driver tool.



5. Stake bearing on both sides with a round punch (D) to prevent bearing from turning.
6. *NOTE:*

Always install new oil seal whenever engine is disassembled for major servicing or when repairing bearings. Always use the correct seal protector to prevent damaging oil seal. Always lubricate seal lips with fresh engine oil before assembling engine components.

Install new oil seal using a suitable cylinder support. Press in new oil seal until it is flush with cylinder.

Item	Measurement	Specification
Wear Limit Specification:		
Magneto Bearing		35.13 mm 1.383 in.)

PTO and Cam Bearing Inspection

Procedure:

1. Remove oil pump.
2. Remove oil seal.



3. Inspect PTO bearing and cam bearing. The cylinder or crankcase cover must be replaced if PTO bearing is worn or scored. If cam bearing is worn or scored, the crankcase cover must be replaced.
4. *NOTE:*

   Install new oil seal whenever engine is disassembled for major servicing or when repairing bearings. Use the correct seal protector to prevent damaging oil seal. Lubricate seal lips with new engine oil before assembling engine components.

   Install new PTO oil seal using a cylinder support. Press in seal until it is flush with mounting surface.

Item	Measurement	Specification
Wear Limit Specifications:		
PTO End Bearing		41.38 mm 1.629 in.)
Cam Bearing		12.75 mm 0.502 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Breather Valve Service

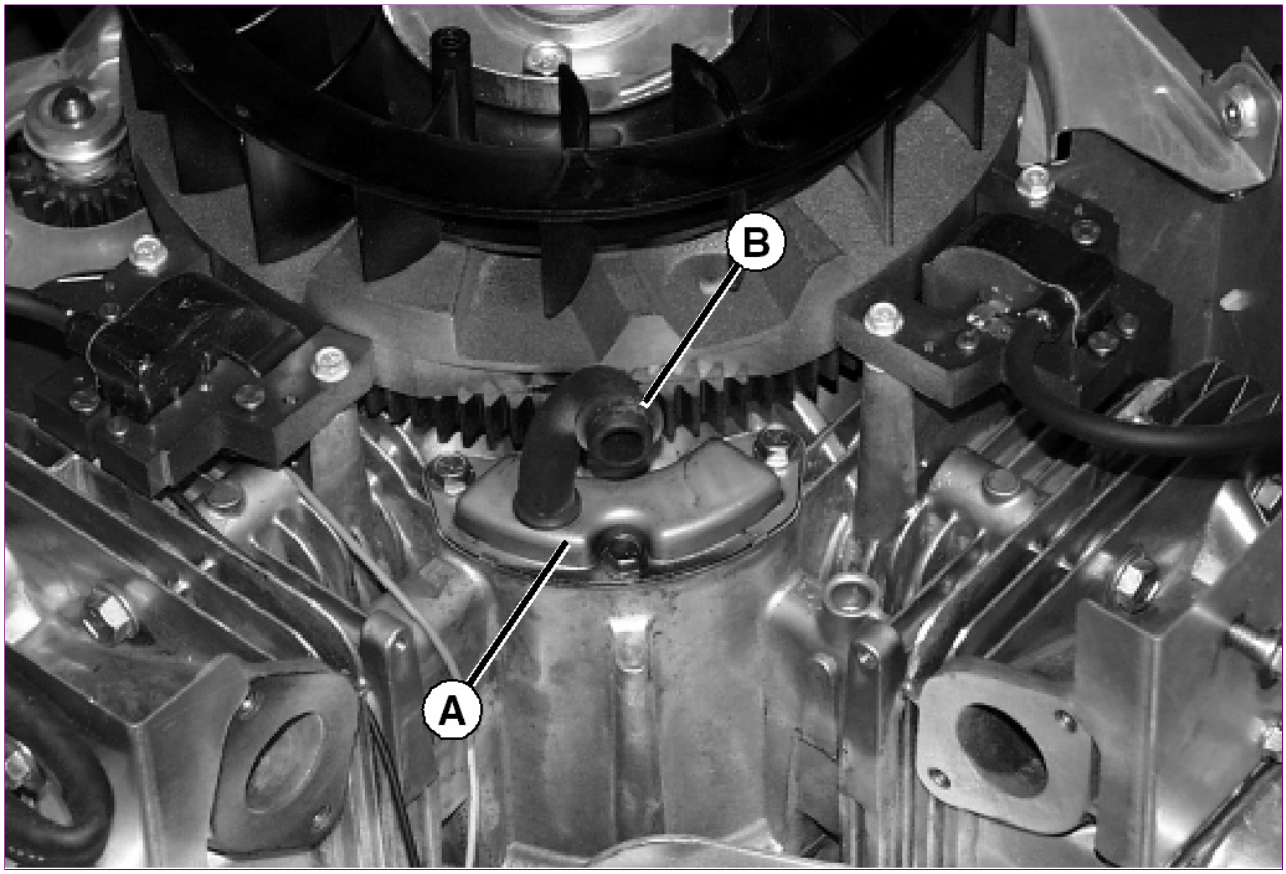
Breather Valve Service

Procedure:

1. *NOTE:*

   A leak at the seal between the tube and crankcase cover, or at the seal at the upper end of the dipstick, can result in a loss of crankcase vacuum and a discharge of oil or smoke through the muffler.

   The engine utilizes a breather valve to control and maintain a vacuum in the crankcase. The breather valve closes on the up stroke of the piston and opens on the down stroke of the piston to maintain a vacuum in the crankcase. This vacuum prevents oil leakage past piston rings, valve guides, oil seals, governor shaft and gaskets.



2. Before breather valve assembly (A) can be removed for inspection, the air cleaner assembly, support bracket, blower housing and intake manifold must be removed as well. See procedures in this section.
3. The breather is vented through the air cleaner to prevent dirt from entering the crankcase. Check breather tube (B) for cracks, holes or hardening. Replace if damaged.
4. **IMPORTANT:**

   Do not use force on reed valve.



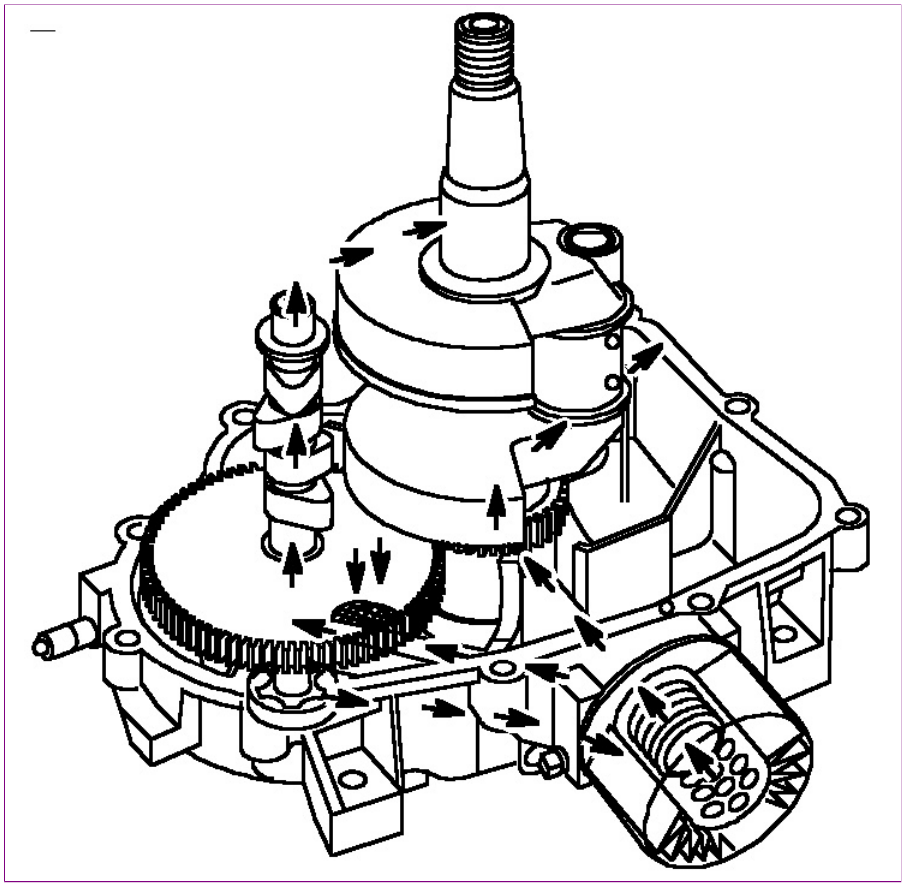
The reed valve is spring loaded and must make a complete seal around the vent hole in breather body. Check to see that reed valve (C) is not deformed.

5. When installing breather, make sure breather gasket is located properly.
6. Place gasket and breather on engine block. Install screw and tighten to specification.
7. Reinstall all removed components.

Item	Measurement	Specification
Specification:		
Breather Cover Screw		6 N•m 55 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Oil Pump Removal and Installation

Oil Pump Removal and Installation



This engine is equipped with a full pressure lubrication system with an oil filter.

The camshaft driven oil pump supplies lubrication to all bearing journals.

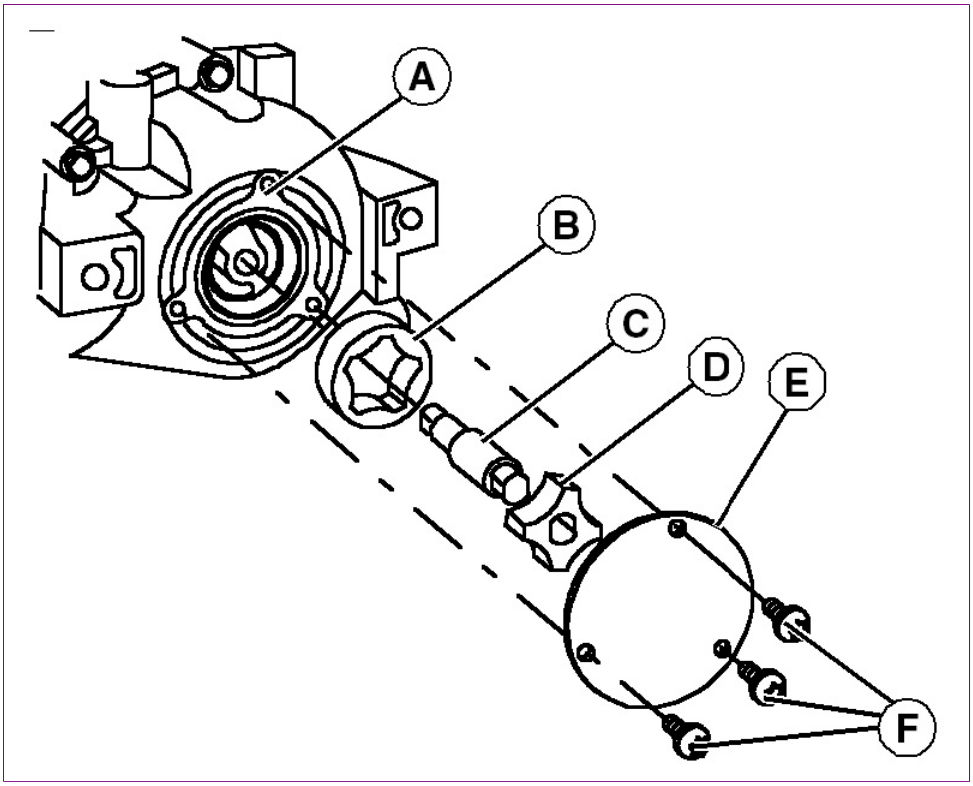
The oil pump draws oil through a screened pick up in the engine base and pumps the oil through the oil filter. The filtered oil flows through oil galleries (passages) in the crankcase cover and cylinder where it is distributed to the main bearings and cam gear bearings.

A pressure relief valve located in the oil pump housing limits the maximum oil pressure in the system.

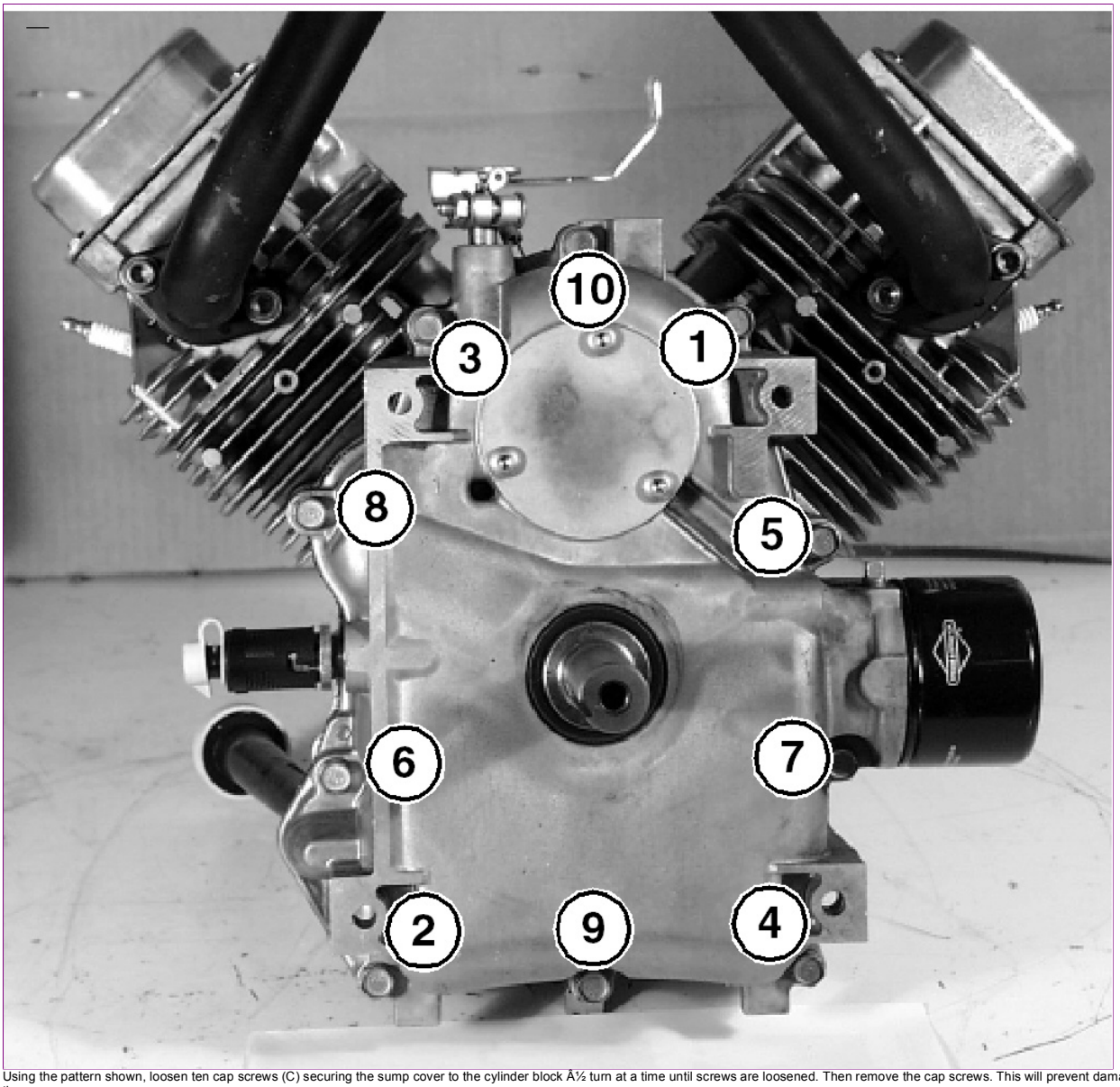
An oil gallery in the crankshaft supplies oil from the magneto bearing to the crankpin, lubricating the connecting rods.

Procedure:

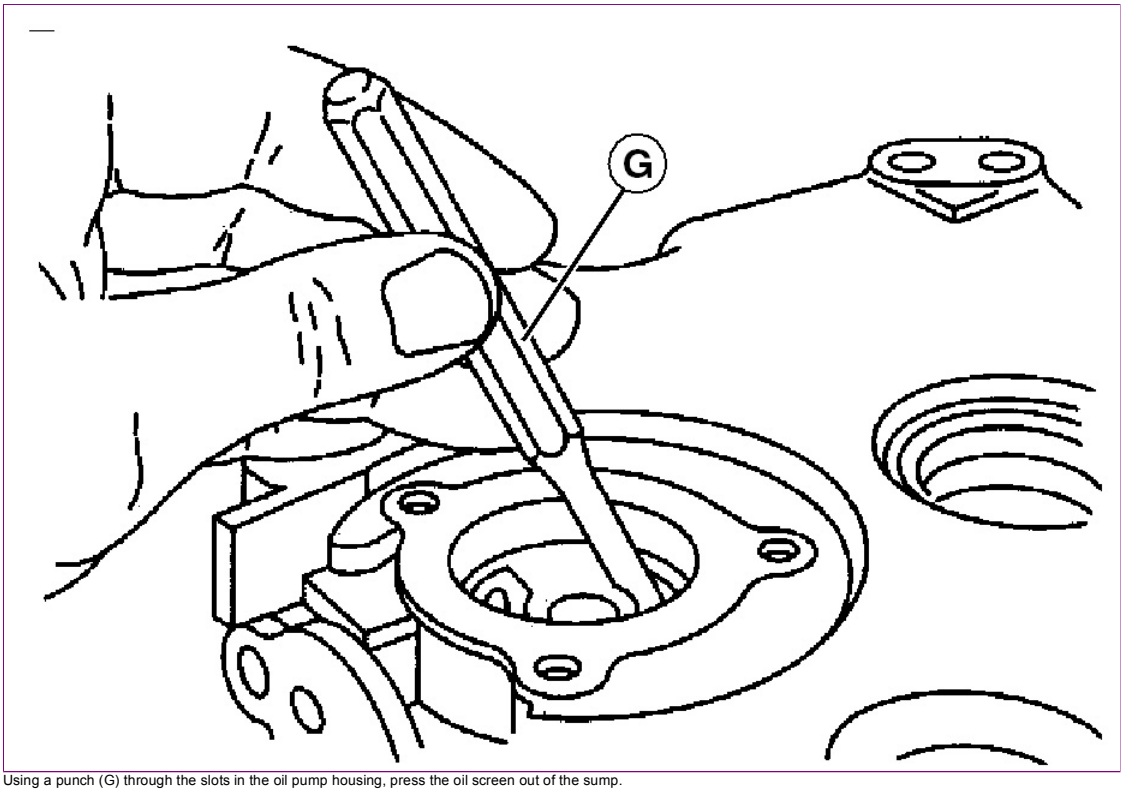
1. Drain oil from sump and filter.
2. Remove rust, foreign material and burrs from the bottom of the crankcase and the crankshaft.



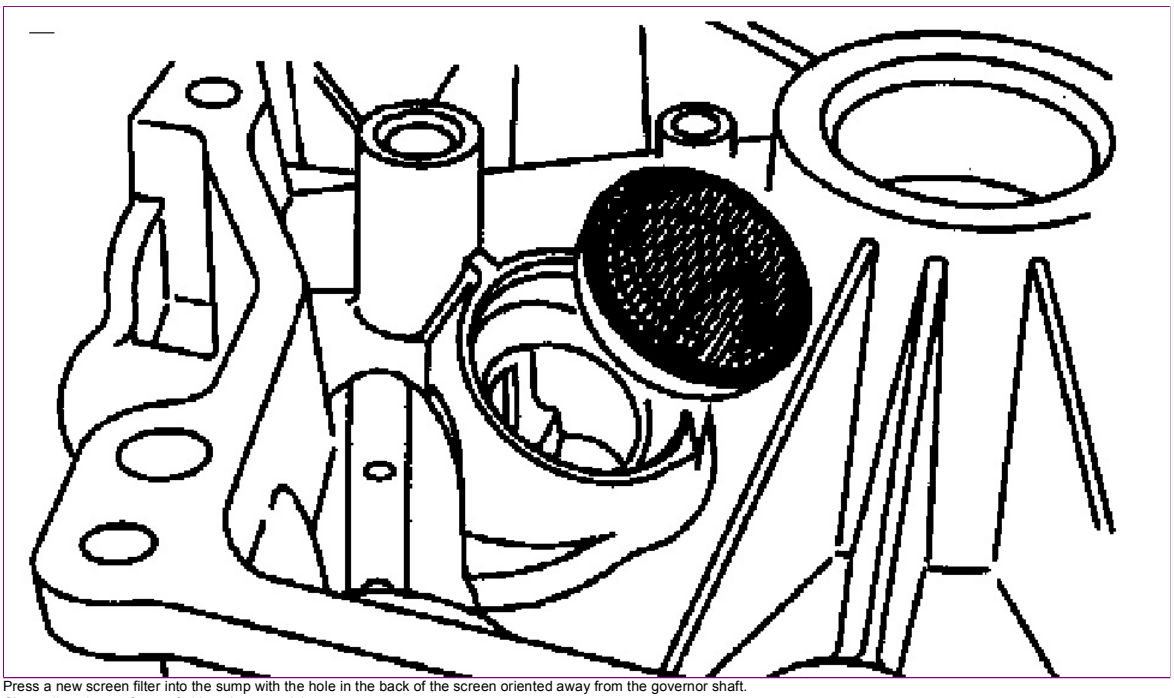
3. Remove three screws (F) securing the oil pump cover. Remove the cover (E) and O-ring (A).
4. Remove the inner (D) and outer (B) rotors and drive shaft (C).
5. Inspect surfaces of the rotors, pump housing, cover and shaft for wear and scoring. Remember to inspect O-ring groove (F) before assembly; clean, if necessary.
6. Inspect pump housing for debris. Clean as needed.
7. Replace any worn or damaged components.
8. If debris is found, the sump should be removed for cleaning and replacement of the oil screen.



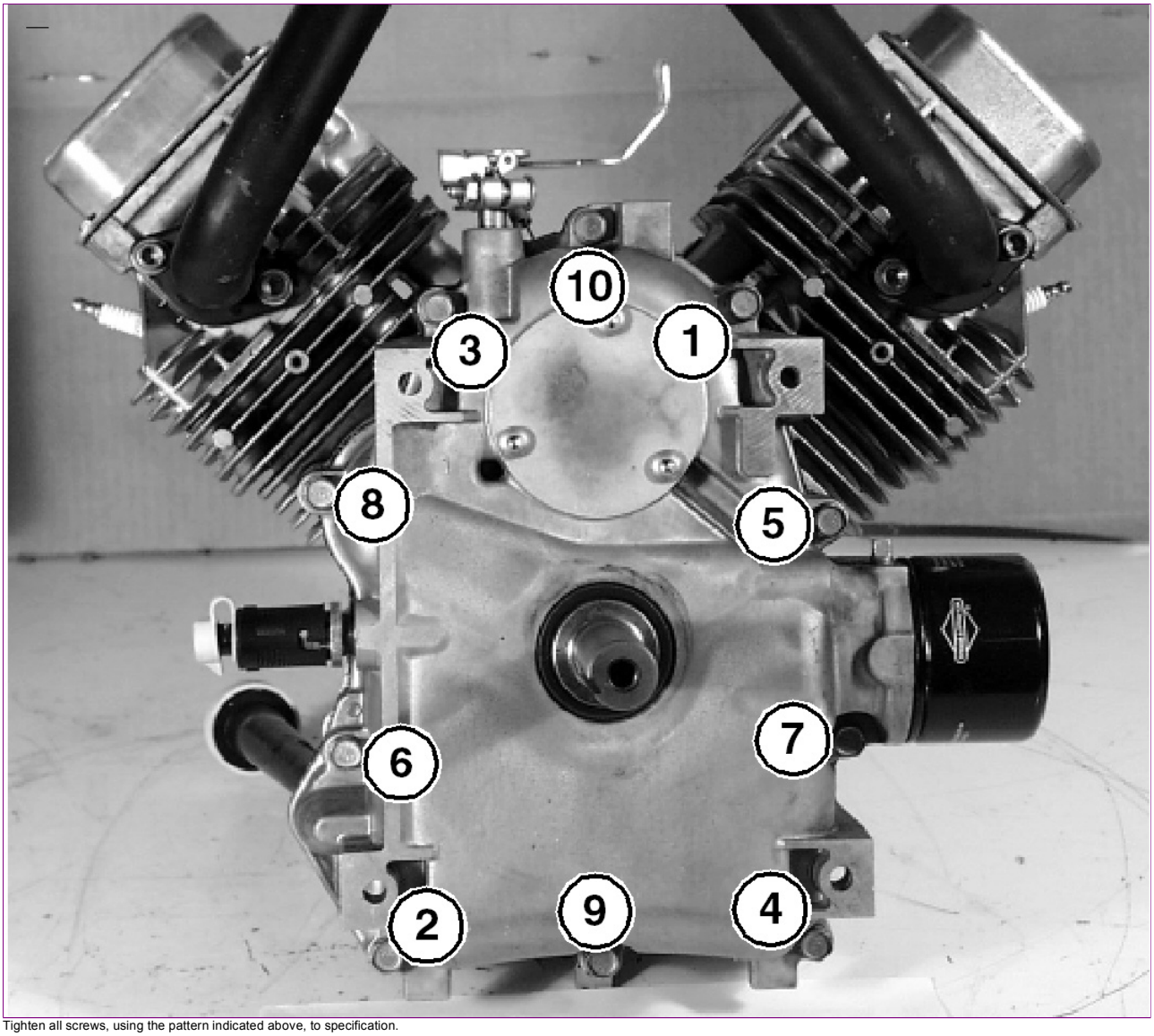
9. Using the pattern shown, loosen ten cap screws (C) securing the sump cover to the cylinder block Ã½ turn at a time until screws are loosened. Then remove the cap screws. This will prevent damage to the sump cover.



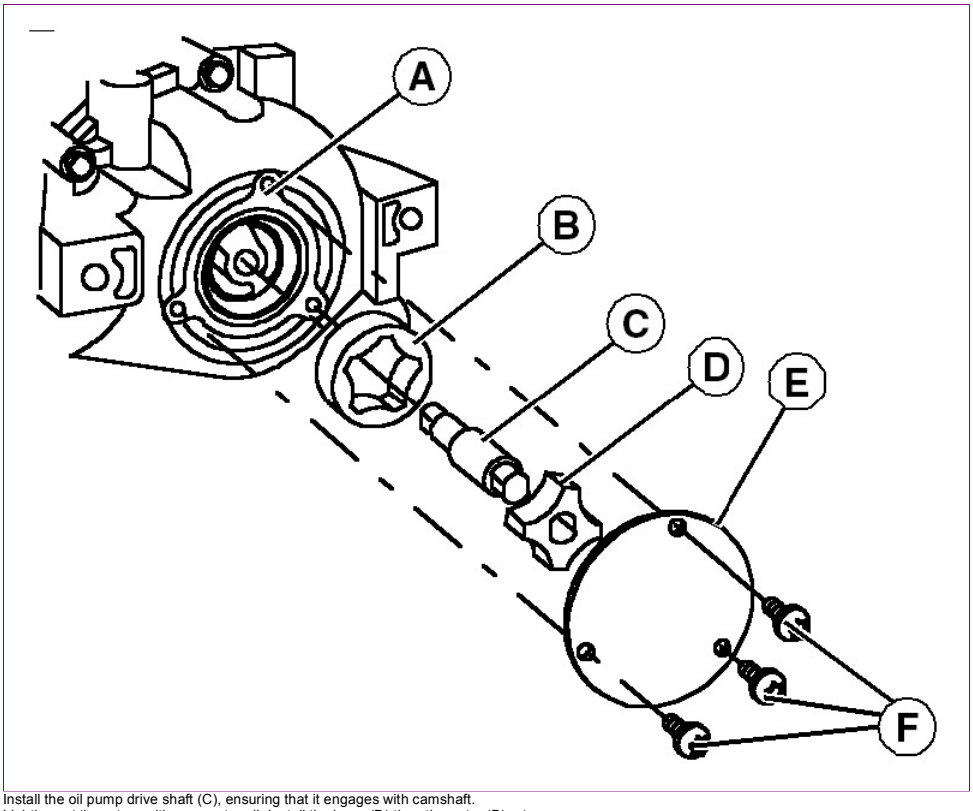
10. Using a punch (G) through the slots in the oil pump housing, press the oil screen out of the sump.



11. Press a new screen filter into the sump with the hole in the back of the screen oriented away from the governor shaft.
12. Clean all gasket surfaces of old gasket material.
13. Install sump and gasket.



14. Tighten all screws, using the pattern indicated above, to specification.



15. Install the oil pump drive shaft (C), ensuring that it engages with camshaft.
16. Lightly coat the rotors with new motor oil. Install the inner (D) then the outer (B) rotor.
17. Insert the O-ring (A) into the O-ring groove in the sump and secure cover (E) with the three screws (F). Tighten the screws to specification.
18. Complete installation of remaining governor linkage and carburetor.
19. Adjust governor.

NOTE:

Engine oil pressure will vary with oil viscosity, ambient air temperature differences, operating temperatures and engine load.

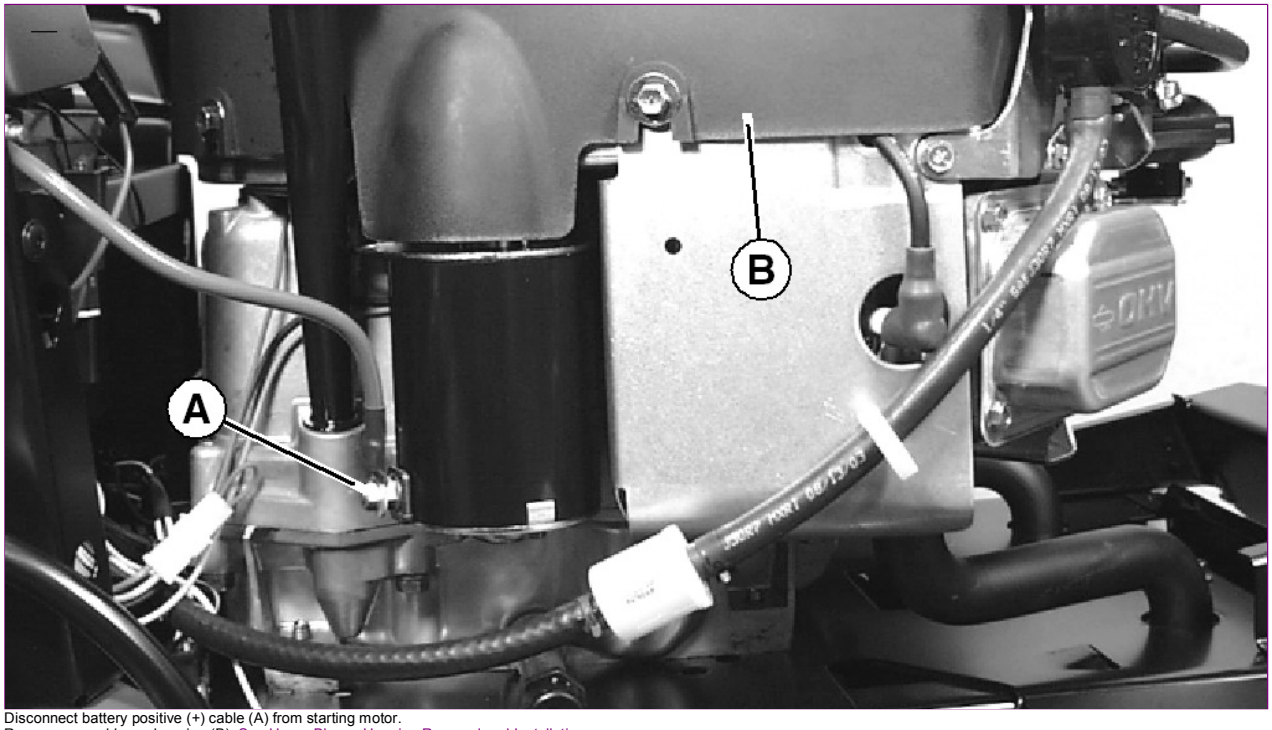
Item	Measurement	Specification
Specifications:		
Oil pressure		103 - 345 kPa 15 - 50 psi)
Sump Cover Screws		23 N•m 200 lb-in.)
Oil Pump Cover Screws		6 N•m 50 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Motor Removal and Installation

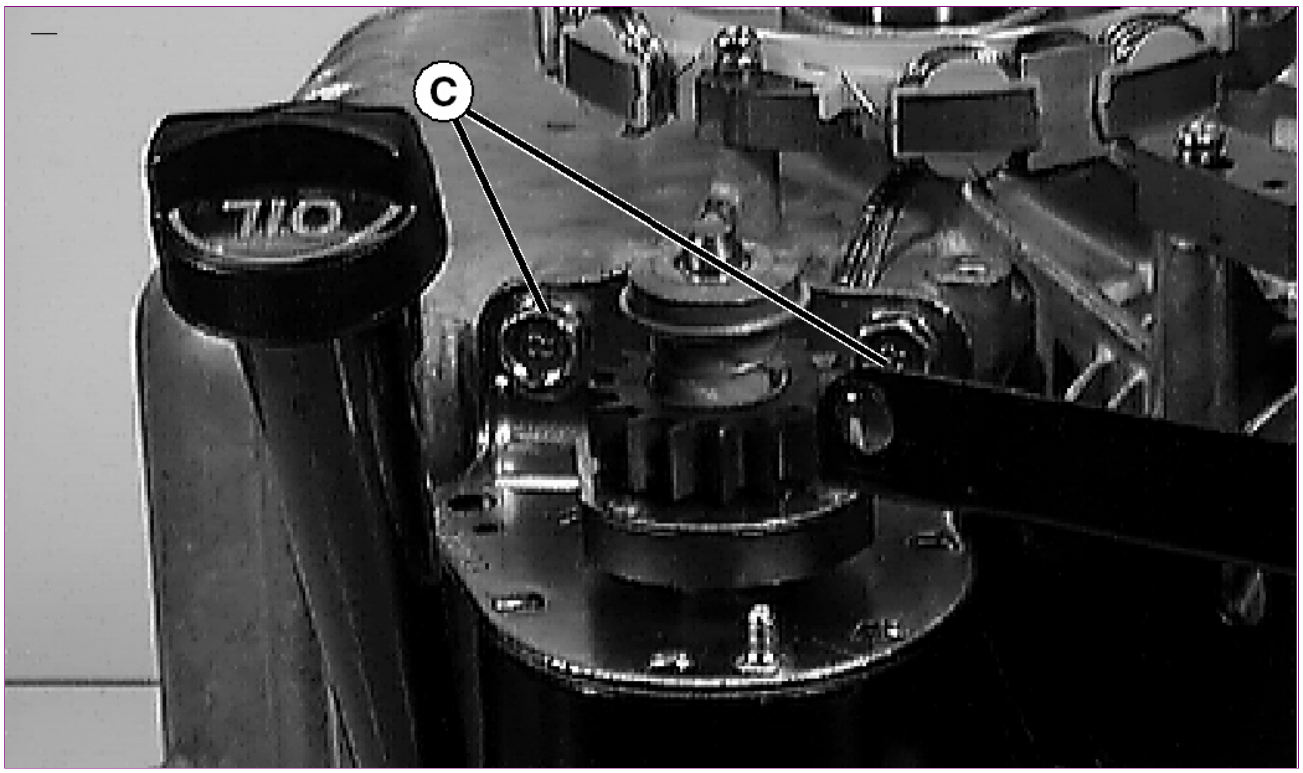
Starting Motor Removal and Installation

Removal:

1. Disconnect the negative (-) battery cable from the battery.



2. Disconnect battery positive (+) cable (A) from starting motor.
3. Remove upper blower housing (B). See Upper Blower Housing Removal and Installation .



4. MXML200812021556969-UN: Flywheel and plate (below and surrounding stator) removed for clarity and/or ease of starting motor removal.

   Remove starting motor bolts (C) and starter.

Installation:

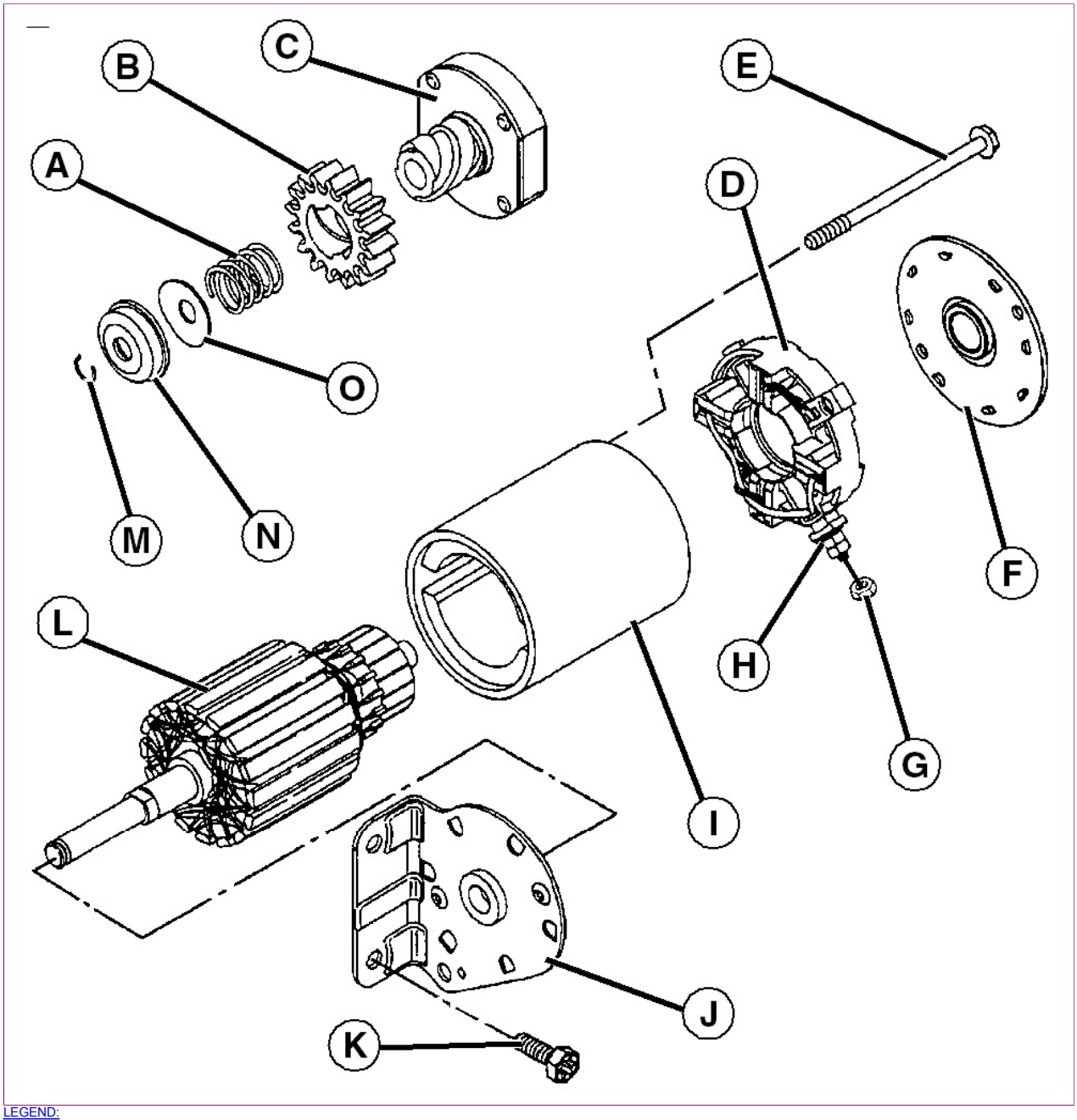
1. Install starting motor bolts and tighten to specification.
2. Install plate (below and surrounding stator) and flywheel (if removed).
3. Install upper blower housing (A). See Upper Blower Housing Removal and Installation .
4. Connect positive cable to the starter.
5. Connect the negative (-) battery cable to the battery.

Item	Measurement	Specification
Specification:		
Starting Motor Bolts		16 N•m 140 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Motor Disassembly

Starting Motor Disassembly

Component Location:



LEGEND:

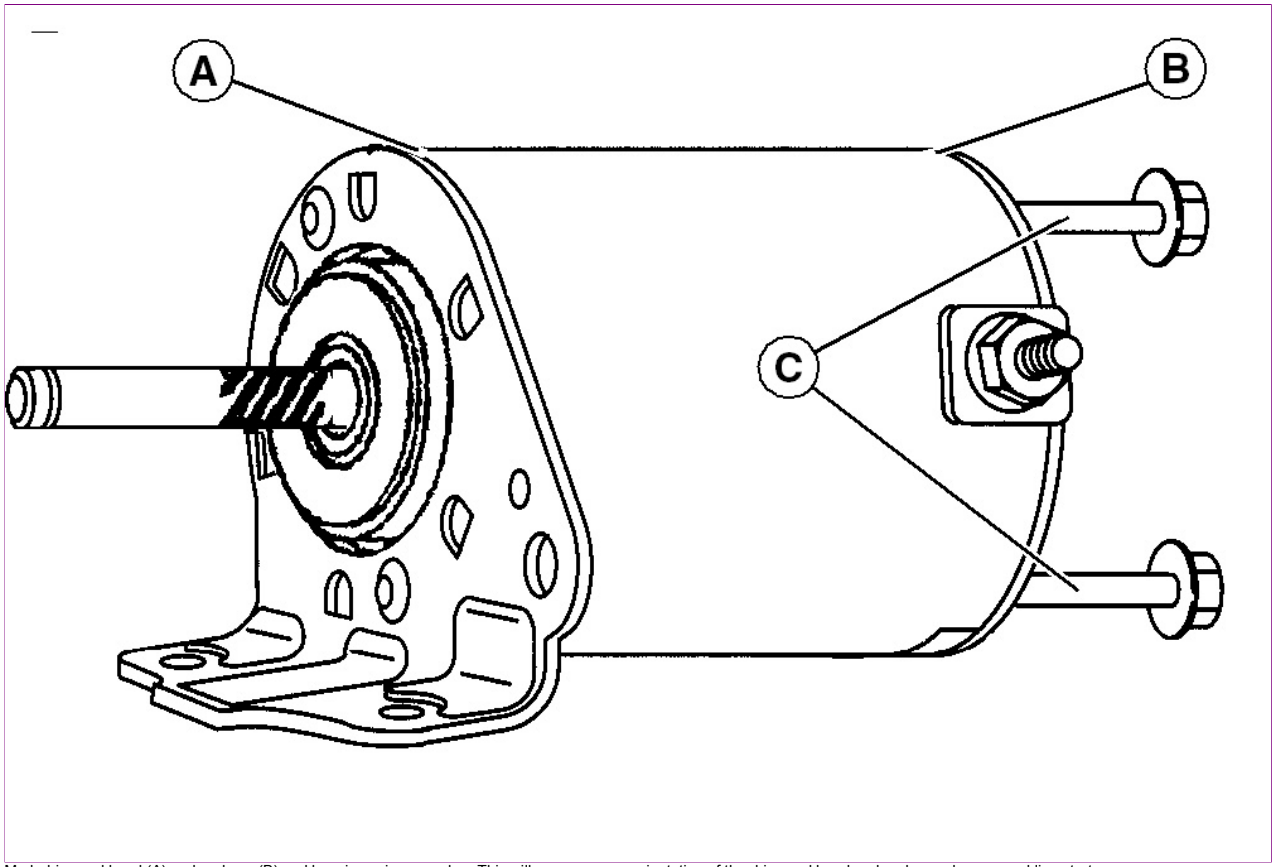
A - Spring
B - Gear
C - Clutch
D - Brush Holder
E - Through Bolt
F - End Cap
G - Nut, Starter Cable
H - Nut, Brush Retainer
I - Housing
J - Drive End Cap
K - Cap Screw
L - Armature
M - C-Ring
N - Cap
O - Washer

IMPORTANT:

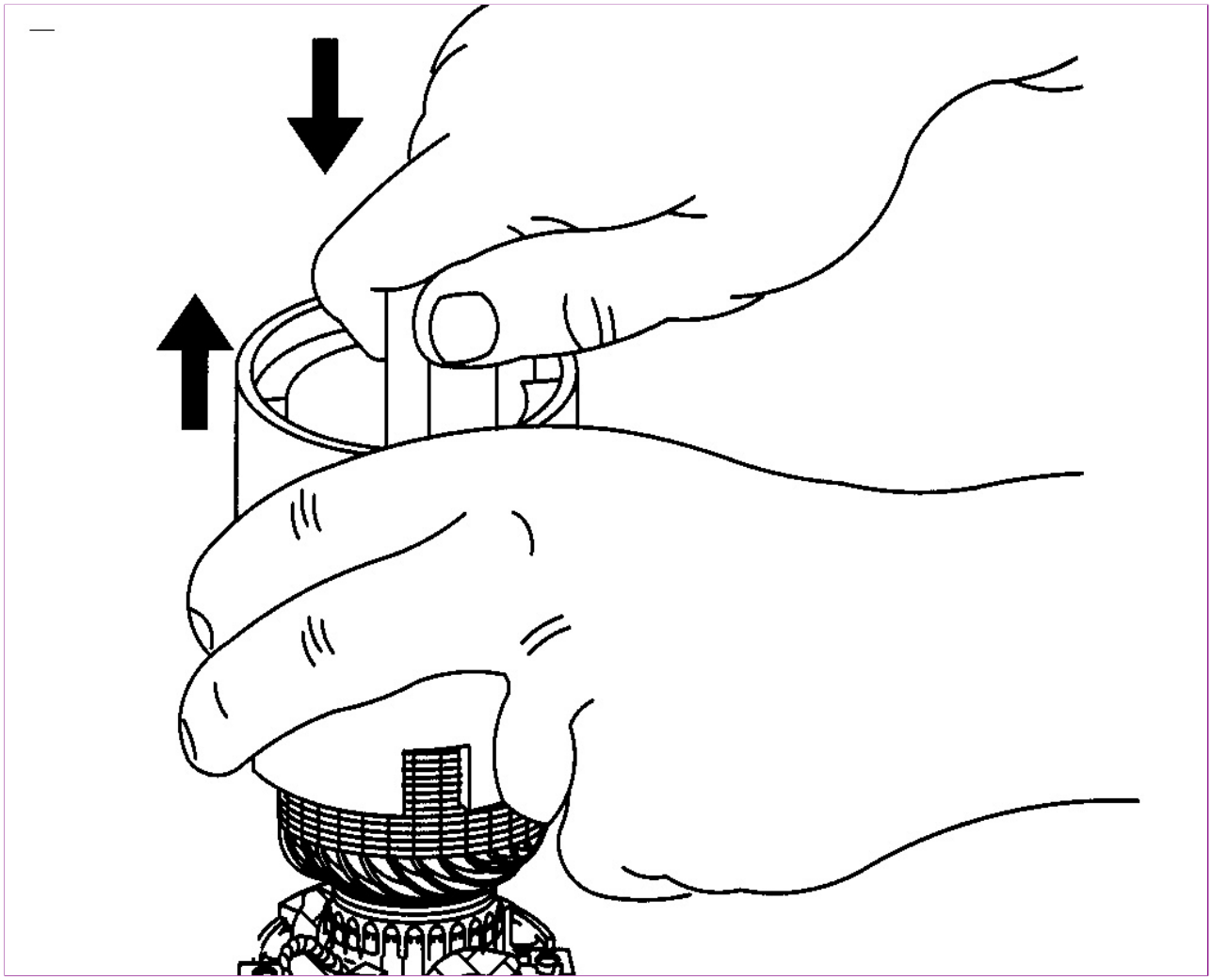
DO NOT clamp motor housing in a vise or strike with a steel hammer. Starter motors contain two powerful magnets that can be broken or cracked if the motor housing is deformed or damaged.

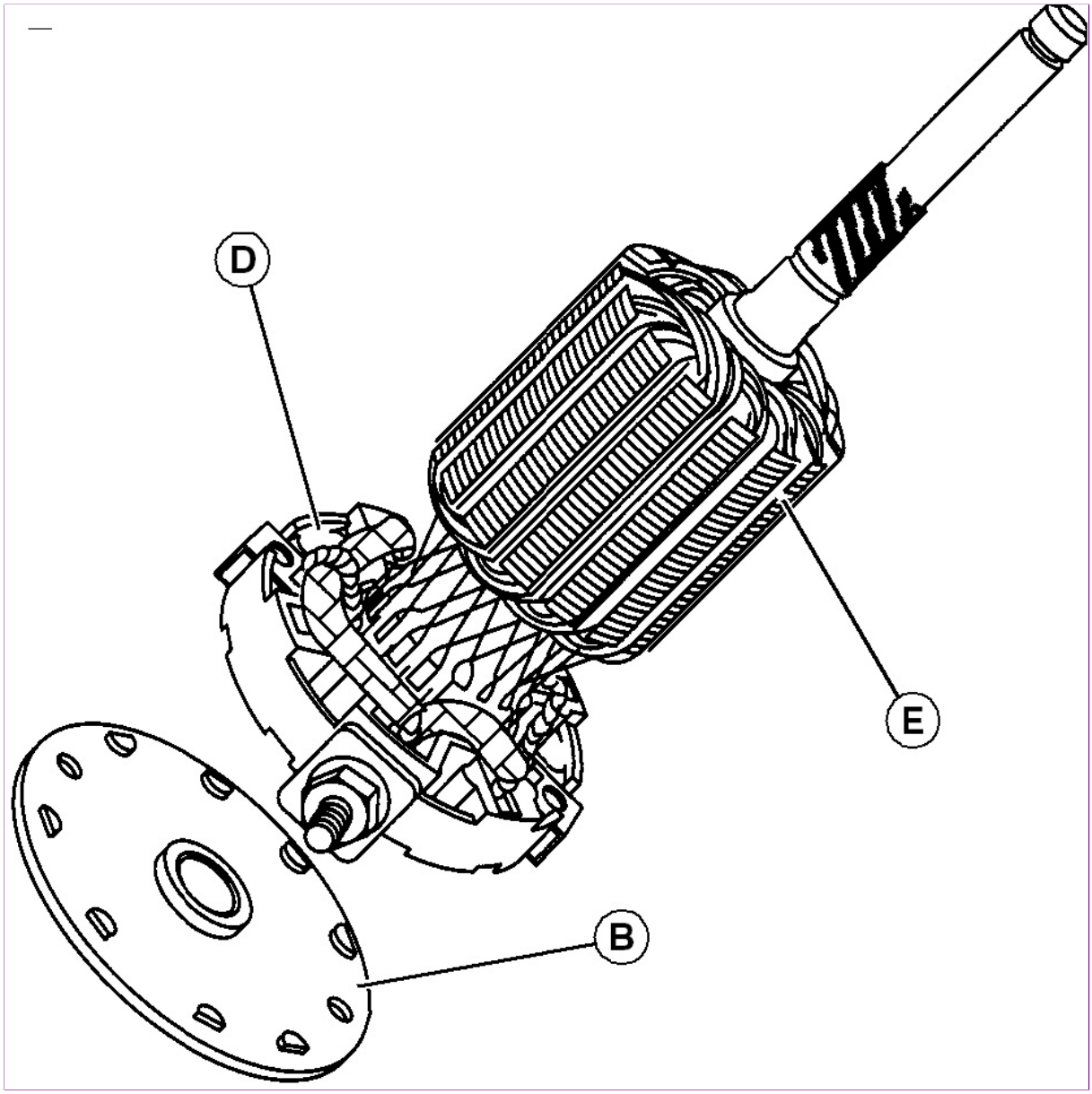
Procedure:

1. Remove pinion gear assembly. See Starting Motor Pinion Gear Replacement .



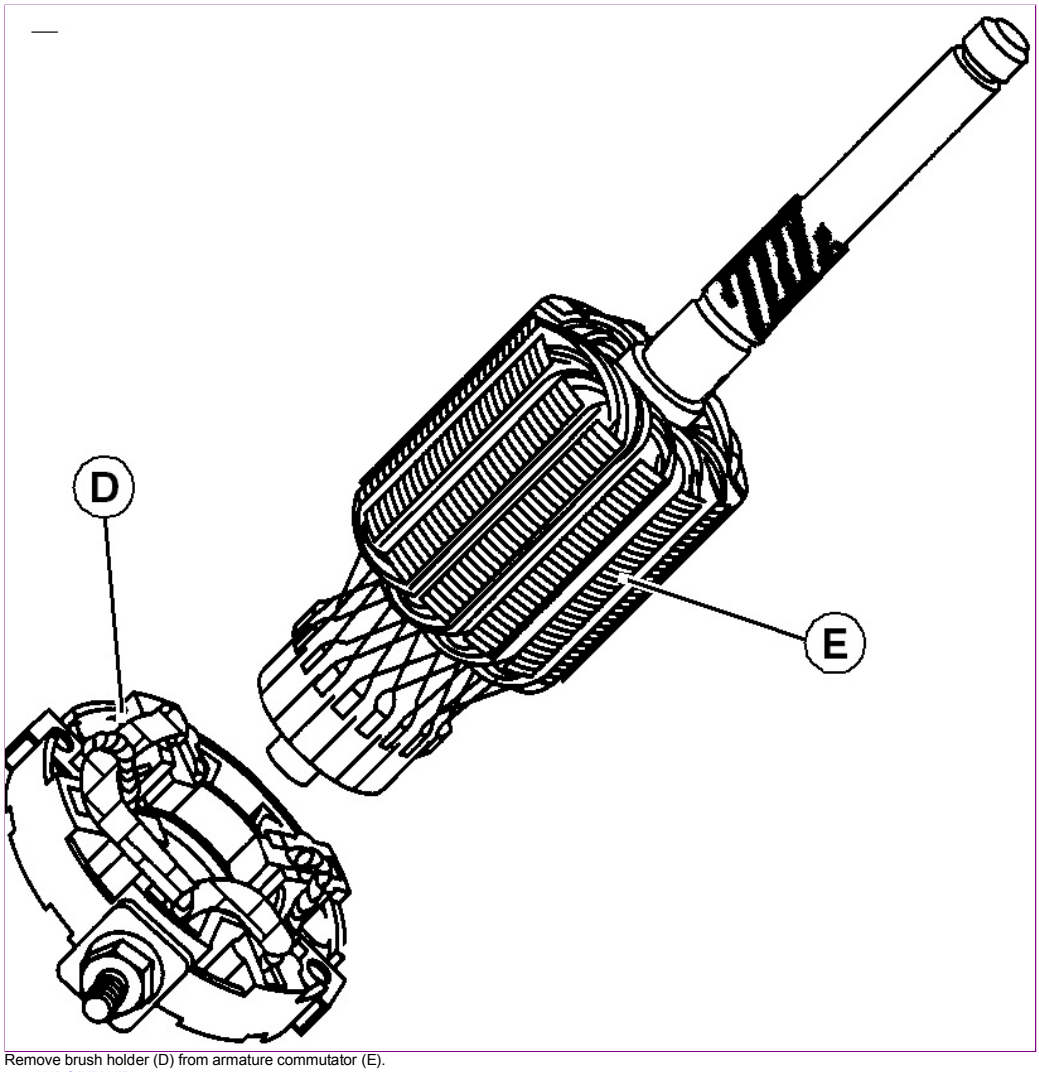
2. Mark drive end head (A) and end cap (B) and housing using a marker. This will assure proper orientation of the drive end head and end cap when assembling starter.
3. Remove bolts (C) and inspect bushing for wear. If worn, replace drive head end assembly.

4. 
Hold the armature and bearing end cap against a work surface while sliding housing off the armature. (This allows the armature to remain in the bearing end cap and brush holder for inspection of brush contact to armature.)



5. While holding brush holder (D) and armature (E), remove bearing end cap (B) from armature.
6. *NOTE:*

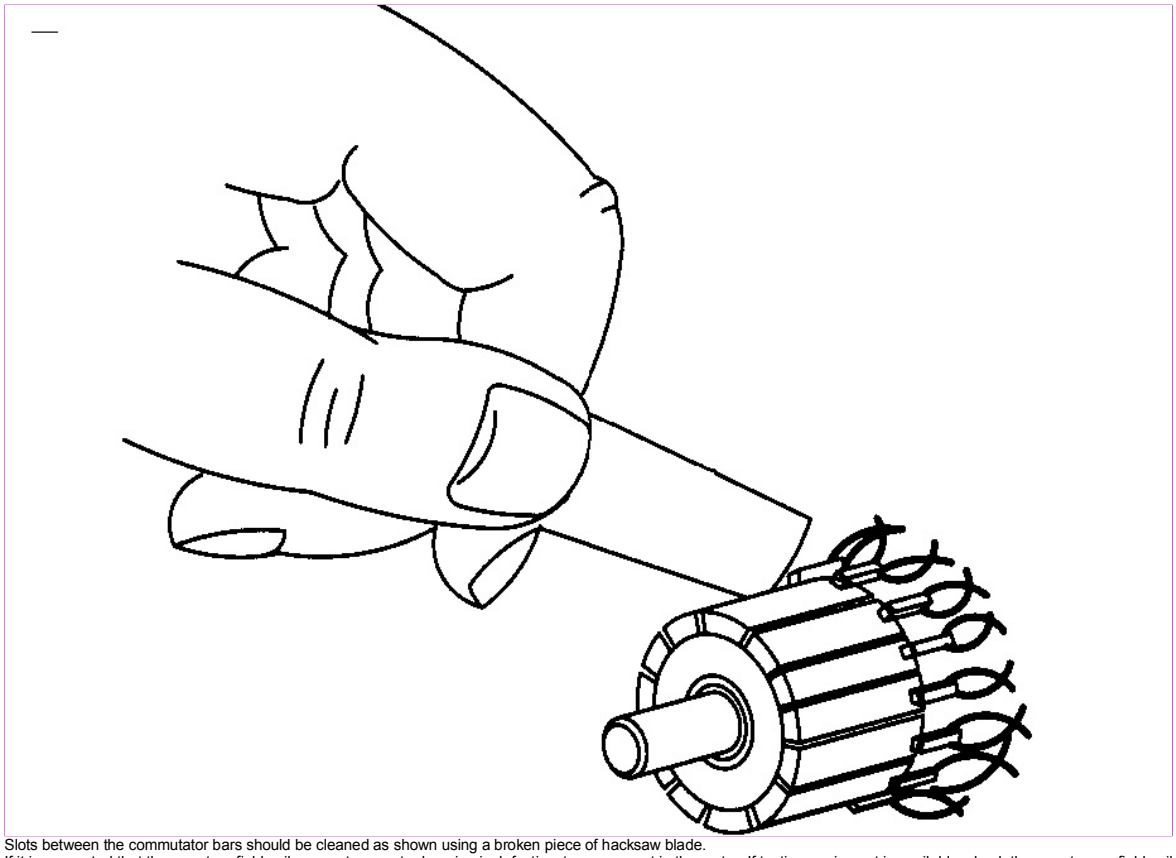
   The bearing housing and armature should not be soaked in a cleaning solution. Fine sandpaper, such as crocus cloth, can be used to clean the armature. The commutator may also be machined with a diamond cutting tool to no less than 31.24 mm (1.230 in.) OD.



Remove brush holder (D) from armature commutator (E).

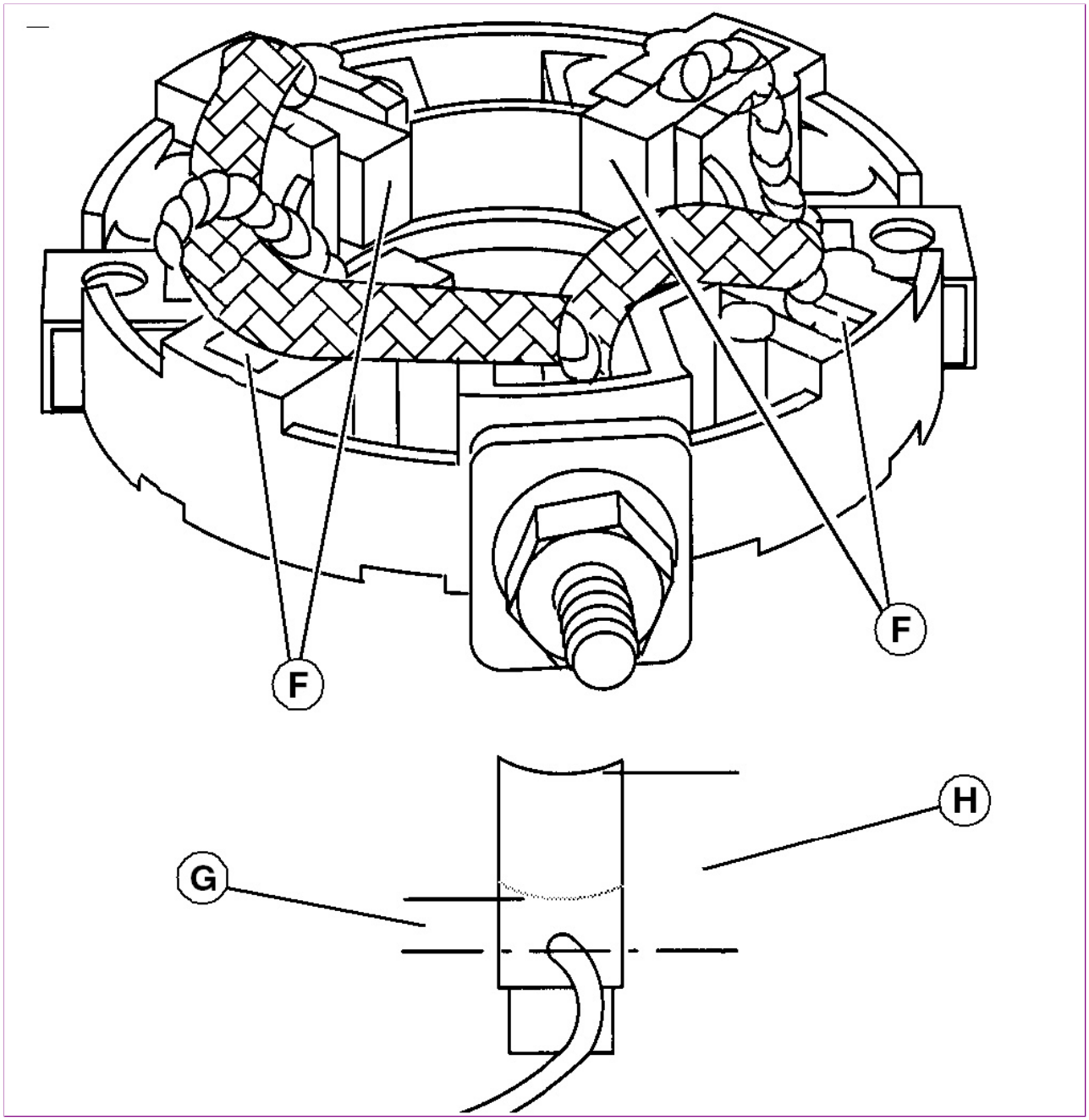
7. **IMPORTANT:**

   DO NOT use emery cloth to clean the commutator. The particles from the cloth will become embedded in the commutator and cause rapid brush wear.



Slots between the commutator bars should be cleaned as shown using a broken piece of hacksaw blade.

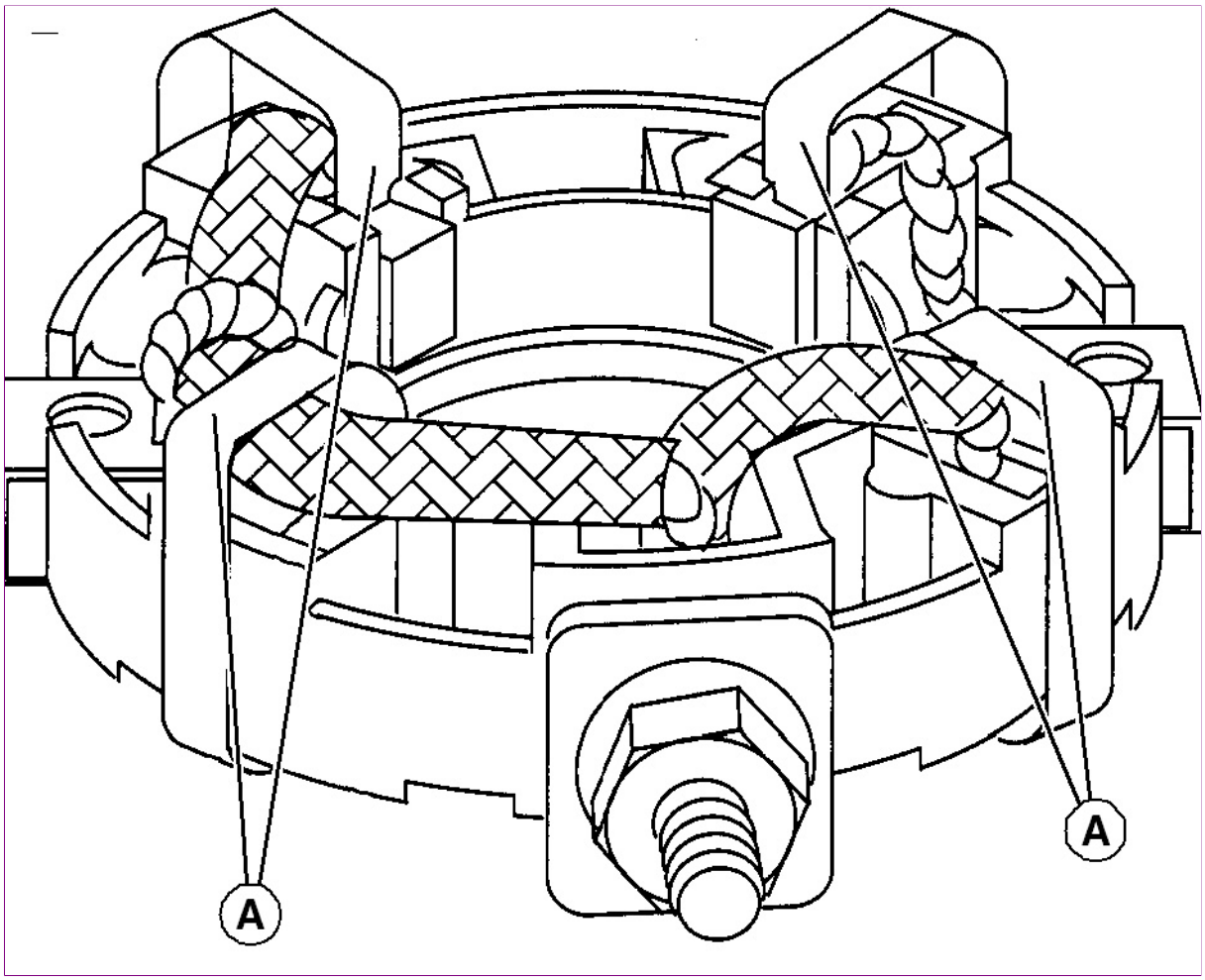
8. If it is suspected that the armature field coil, magnets or motor housing is defective, try a new part in the motor. If testing equipment is available, check the armature or field coil to determine if it has open or grounded circuits.



9. The brushes (F) should be checked for proper seating, weak brush springs, dirt, oil or corrosion.
10. Comparing to normal length when new (H), if brushes are worn to **3.2 mm (0.126 in.)** (G), replace brushes. When all parts have been thoroughly cleaned, lightly lubricate the bearings with #20 oil.

Starting Motor Assembly

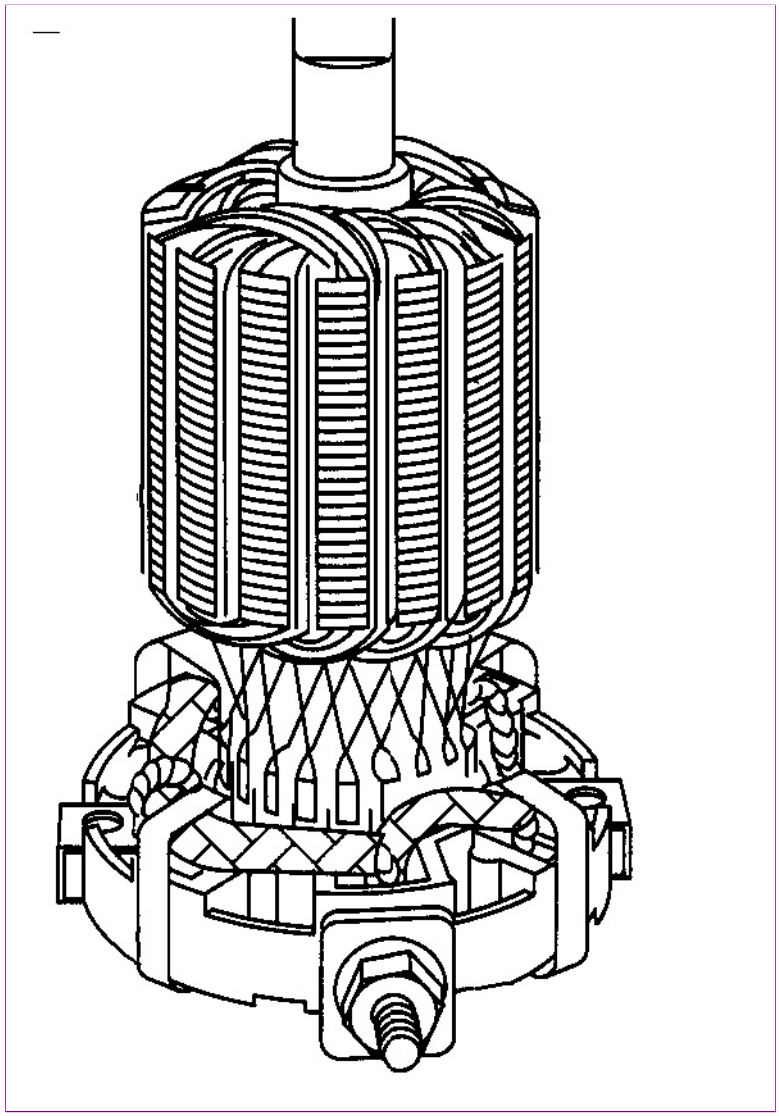
Procedure:

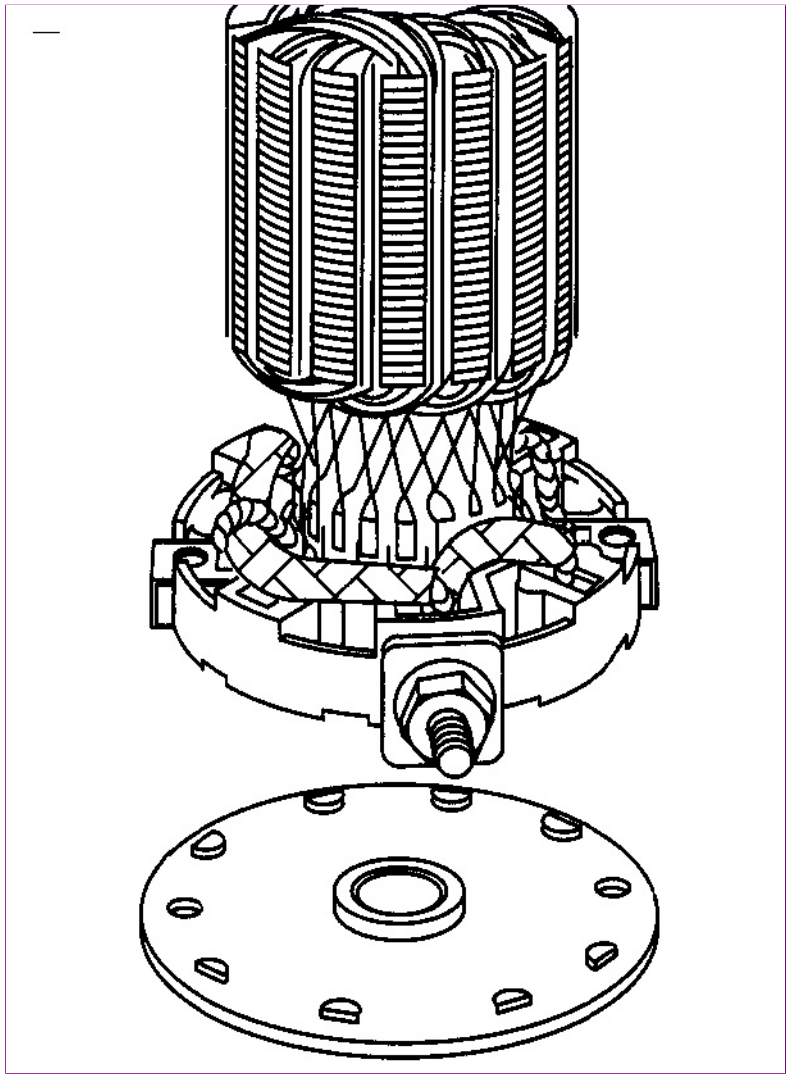


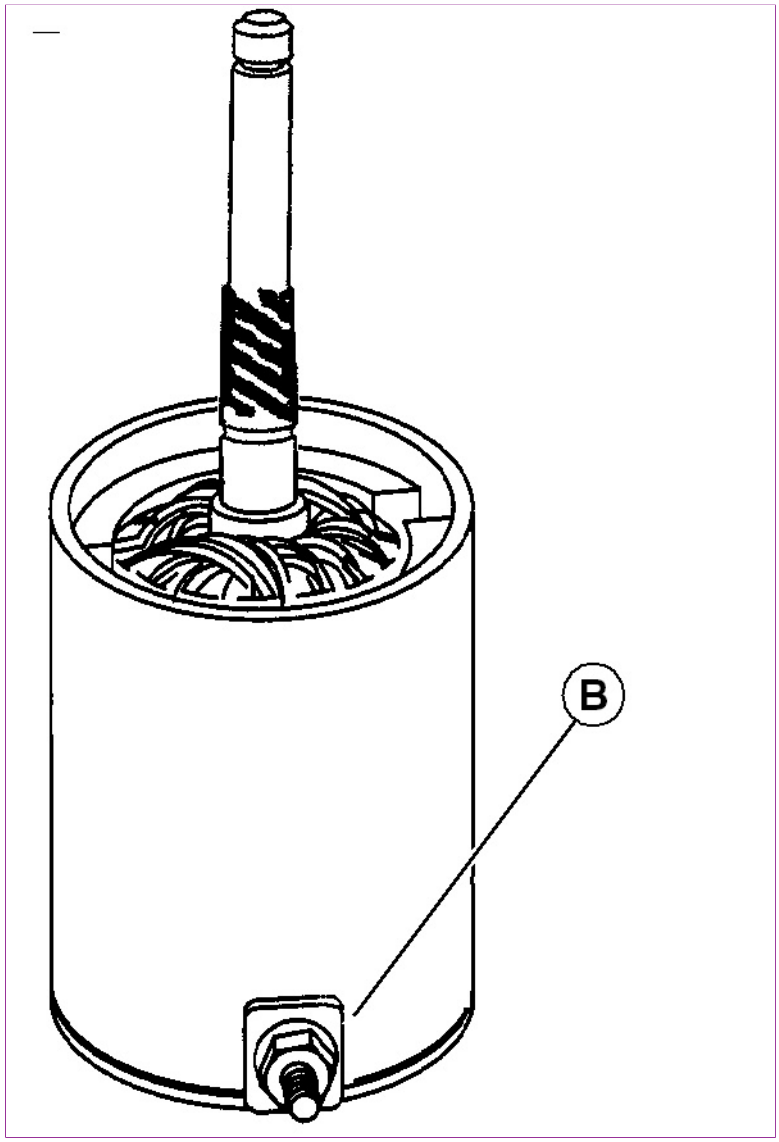
NOTE:

Brush retainers (A) can be made from standard paperclips. Straighten paperclips and cut to 64 mm (2 1/2 in.). Bend into a U-shape with sides 25 mm (1 in.) and bottom 13 mm (1/2 in.) in length.

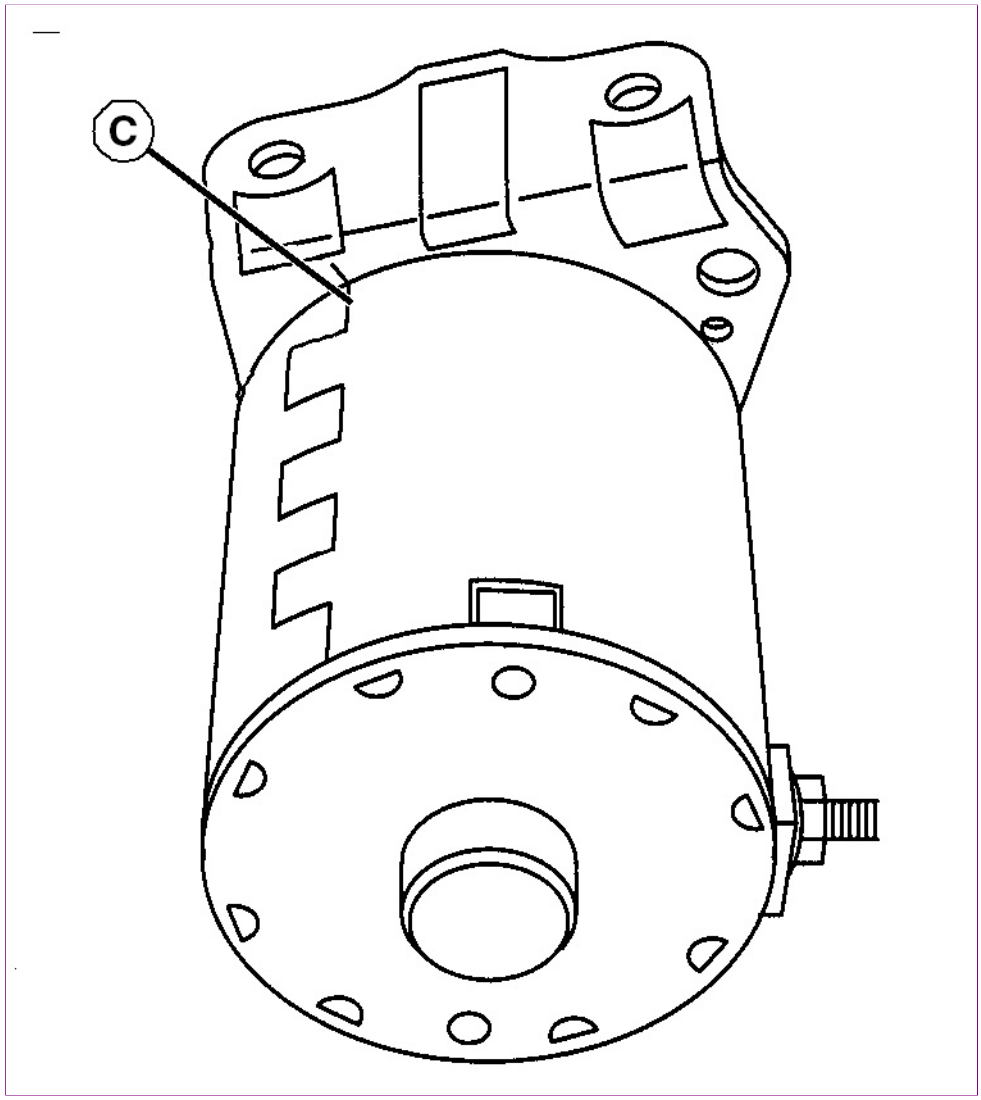
1. Place brushes in their slots. Hold brushes with retainers.

2. 
Place armature commutator in brush holder and remove brush retainers.

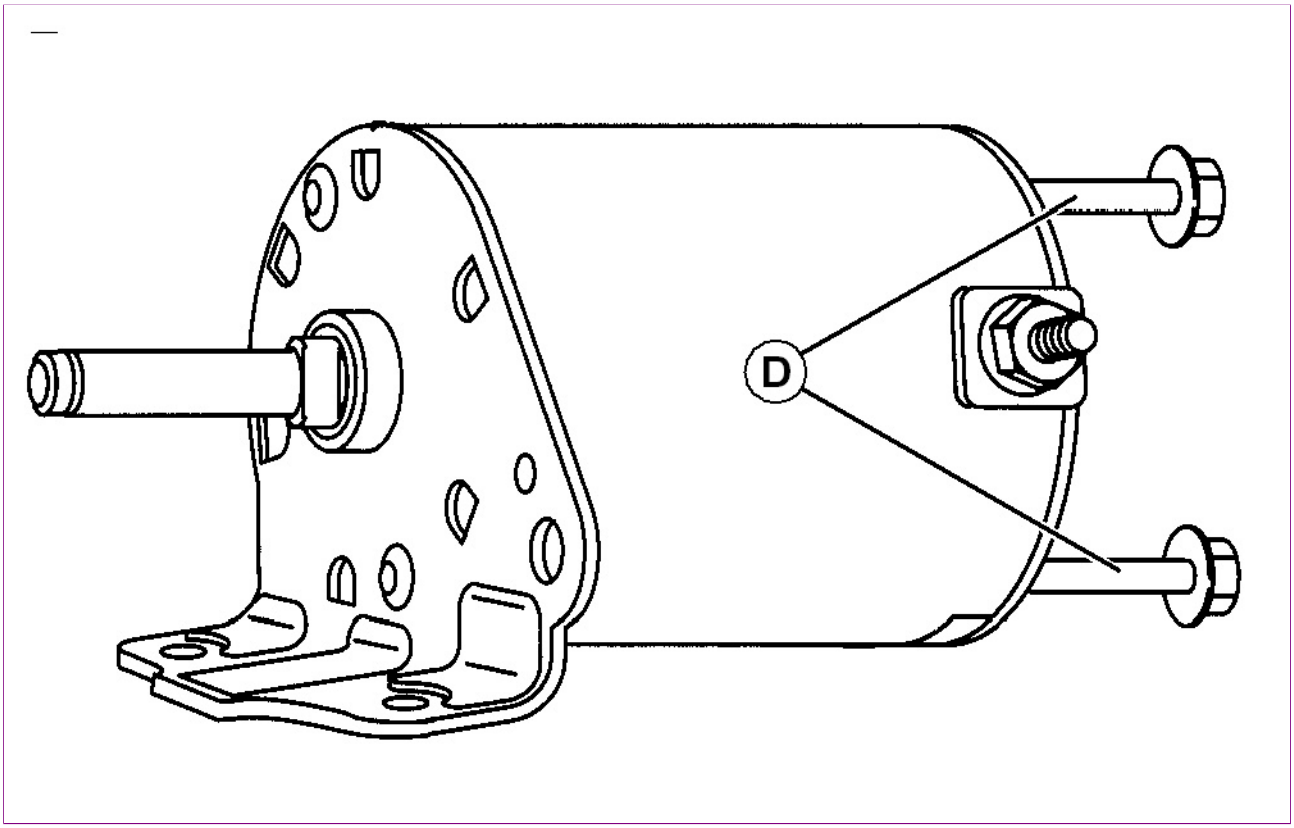
3. 
Install bearing end plate on armature commutator journal making sure plate indexes with brush holder.

4. 

Slide motor housing over armature with the notch (B) toward brush holder.



5. Place drive end cap on starting motor housing making sure that marks on drive end head and end cap lines up with housing mark (C).



6. Install bolts in starting motor (D), use starting motor clutch to check for binding of armature shaft. Correct if it binds.
7. Install starting motor drive. (Perform steps 7-12 in “Starting Motor Pinion Gear Replacement”).
8. Install starting motor and tighten bolts to specification.

Item	Measurement	Specification
Specifications:		
Starting Motor Bolts		16 N•m 140 lb-in.)
Through Bolts		6 N•m 50 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Motor Pinion Gear Replacement

Starting Motor Pinion Gear Replacement

NOTE:

If replacing only the pinion gear, the starting motor does not have to be removed from the engine.

Required tools:

- JDG1087 C-Ring Remover
- JDG1086 C-Ring Installer

Procedure:

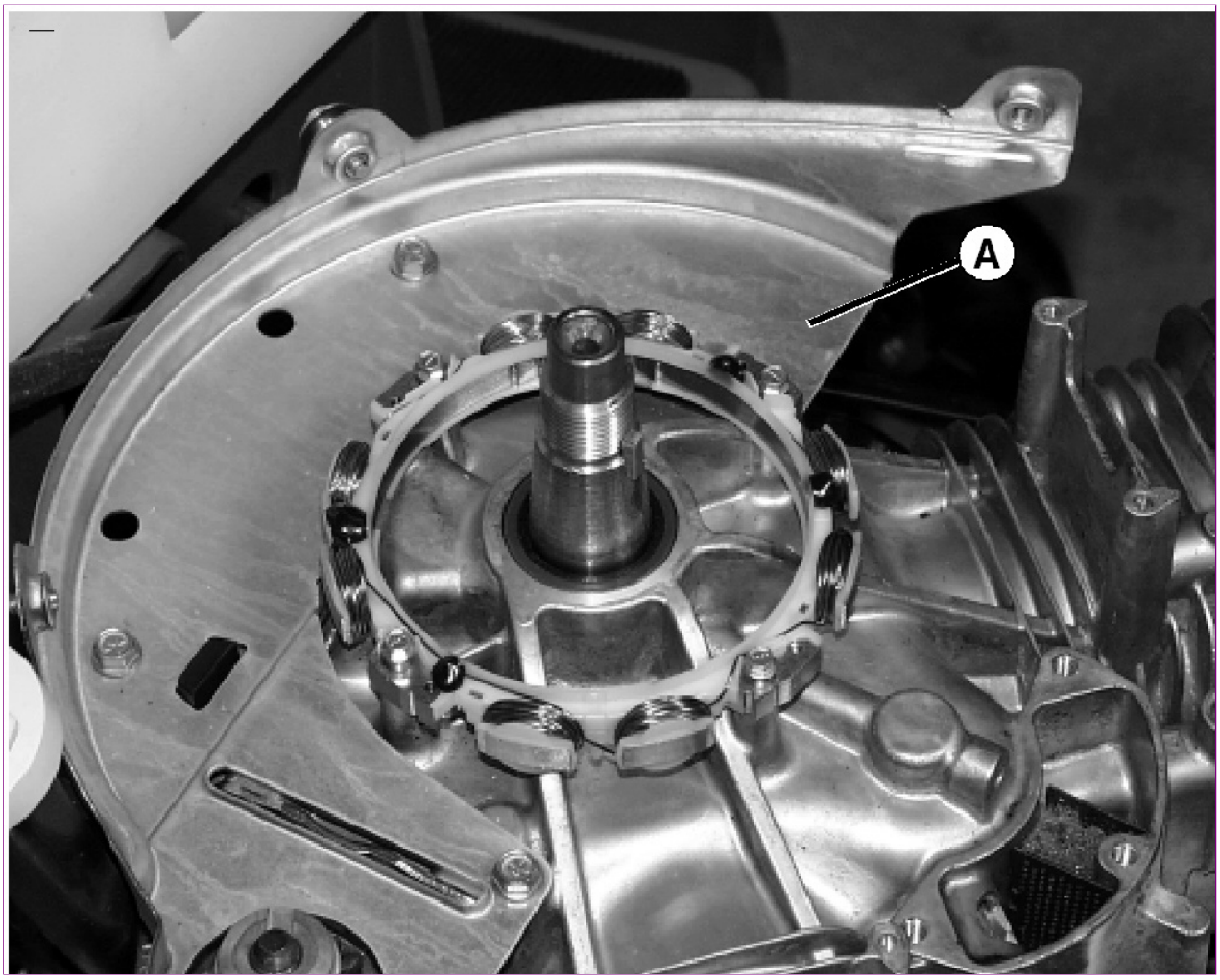
1. Disconnect the negative (-) battery cable from the battery.
2. Remove upper blower housing and flywheel.
3.

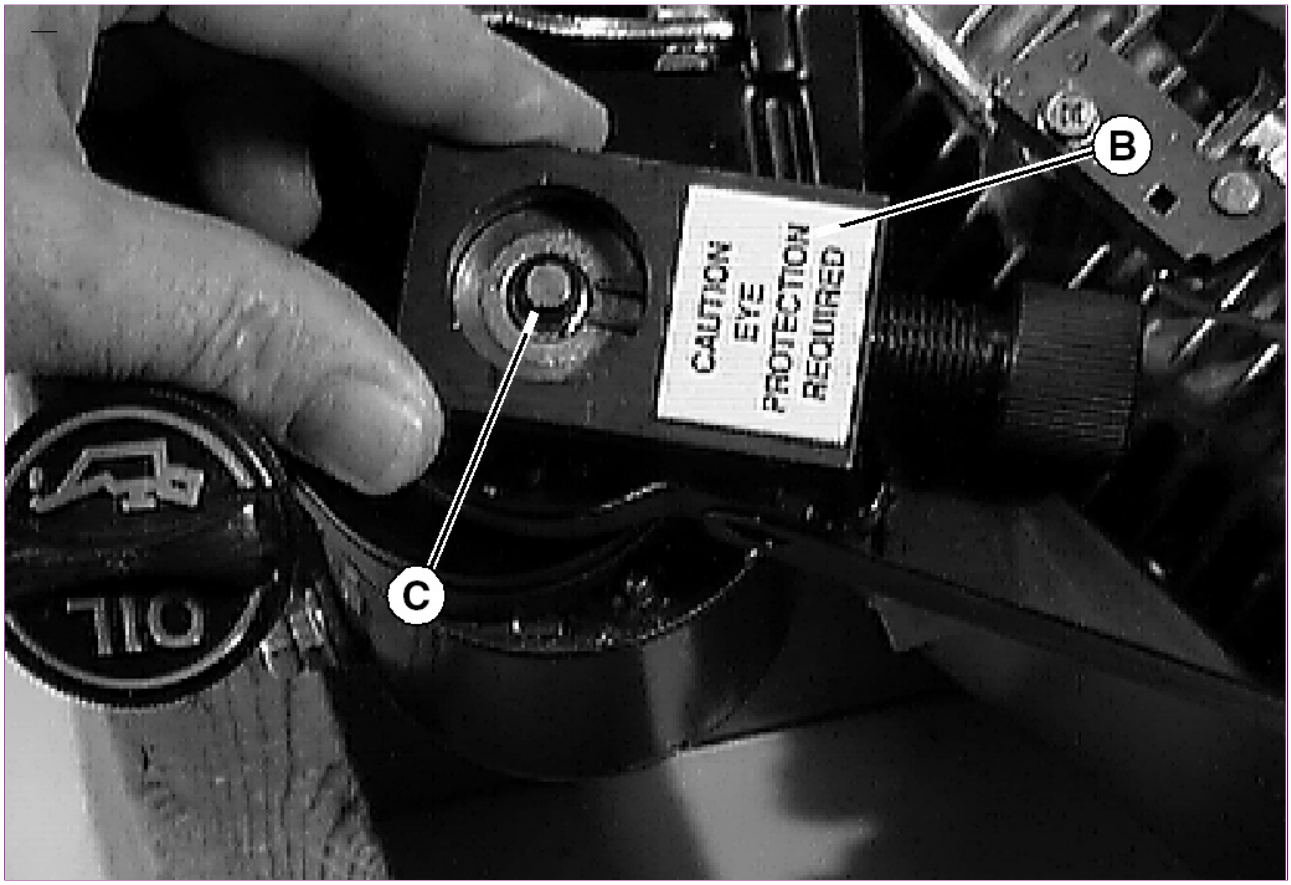
CAUTION:

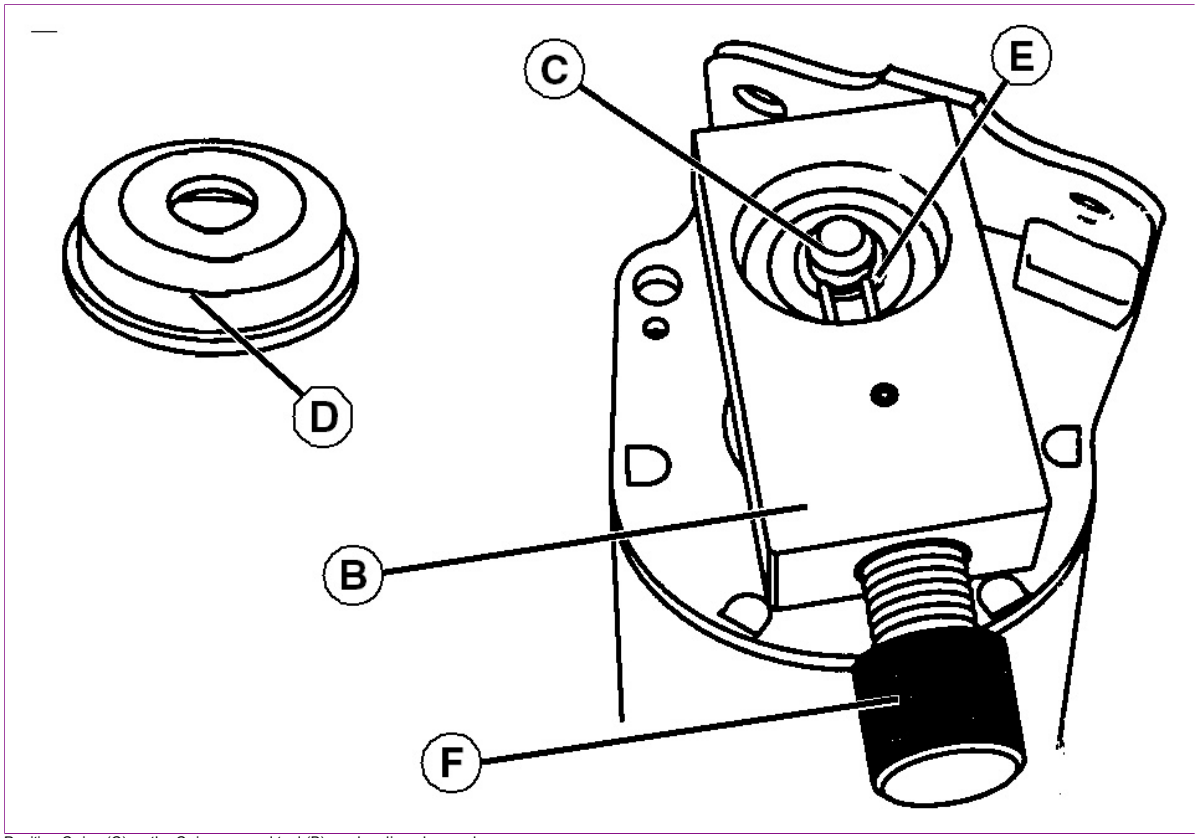
Components are installed under spring tension. Wear eye protection and use proper tools when installing and removing components with spring tension.

NOTE:

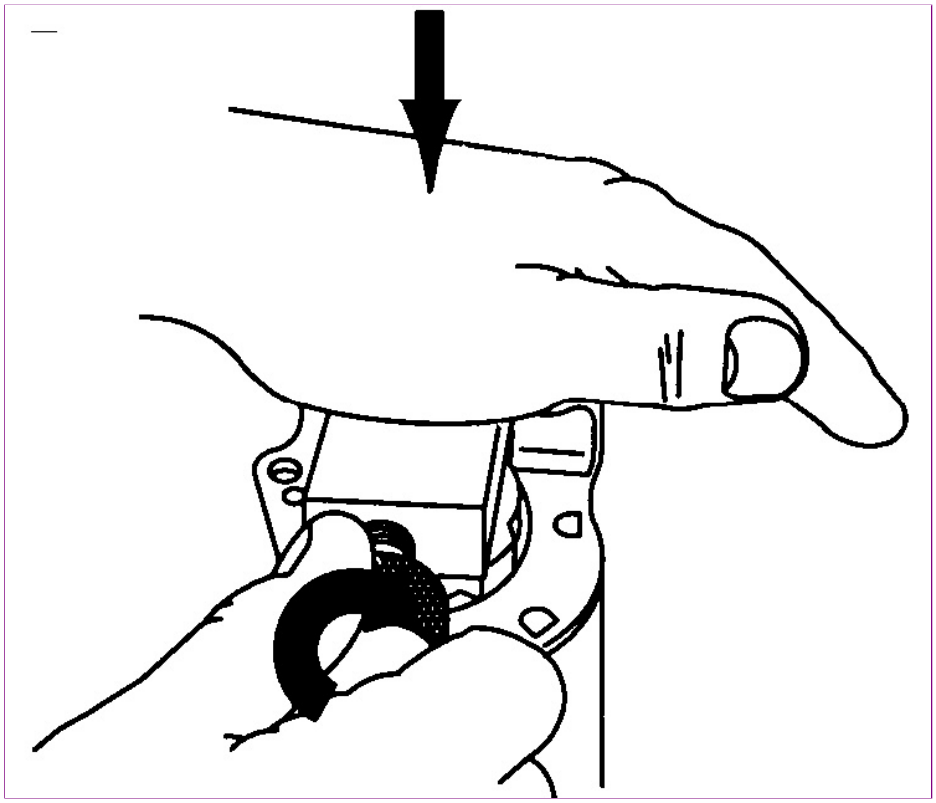
The plate (A) surrounding and below the stator does not have to be removed.







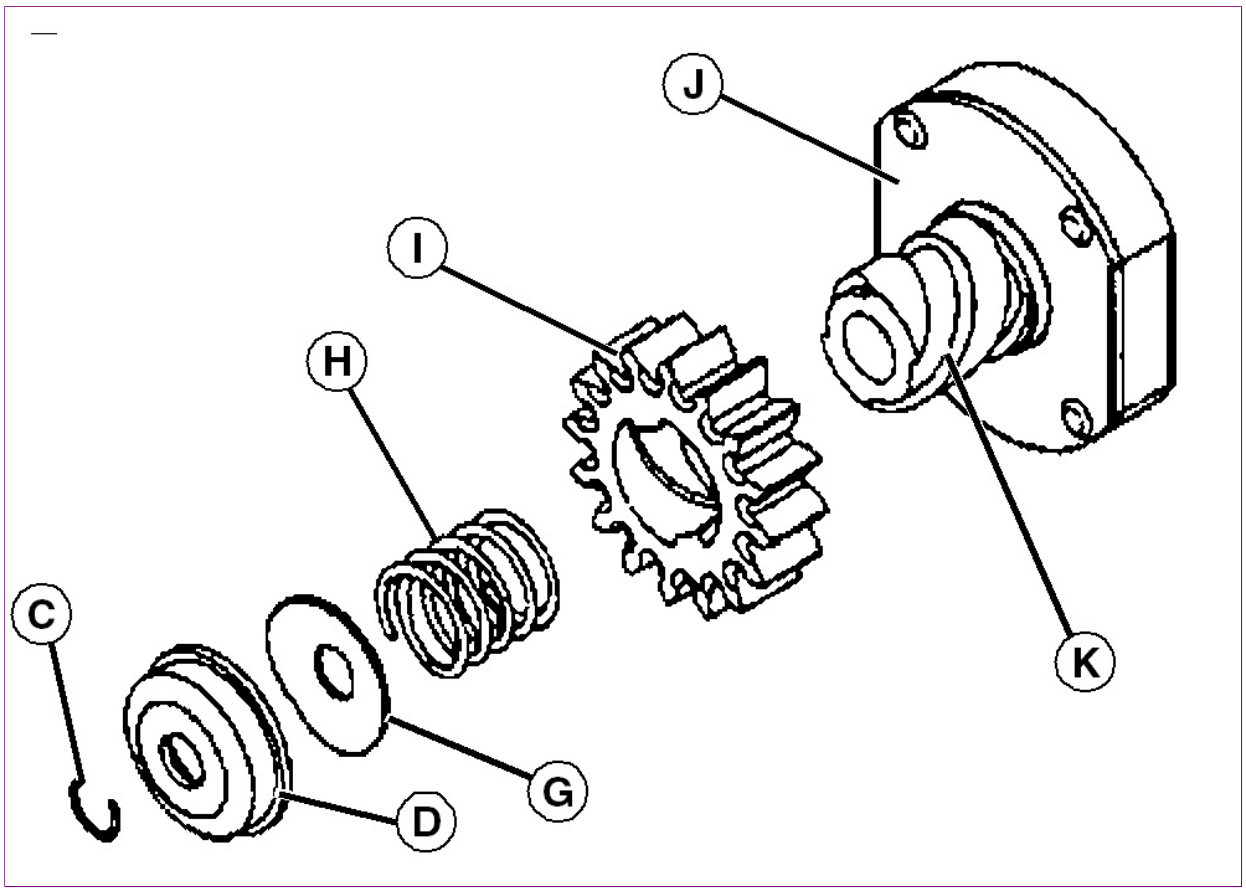
Position C-ring (C) so the C-ring removal tool (B) can be aligned properly.



4. Install C-ring removal tool (B), JDG1087 over retainer (D) and compress spring.
5. *NOTE:*

   The C-Ring (C) is not reusable once removed.

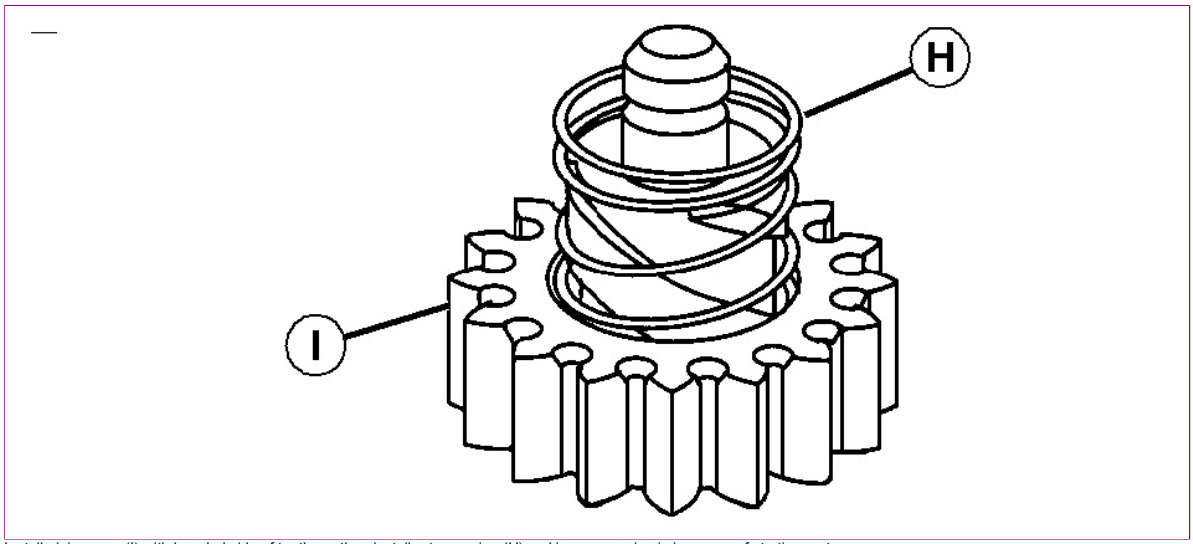
   Screw in the handle (F) until the drive pins (E) on the tool force the C-ring from the starting motor shaft.



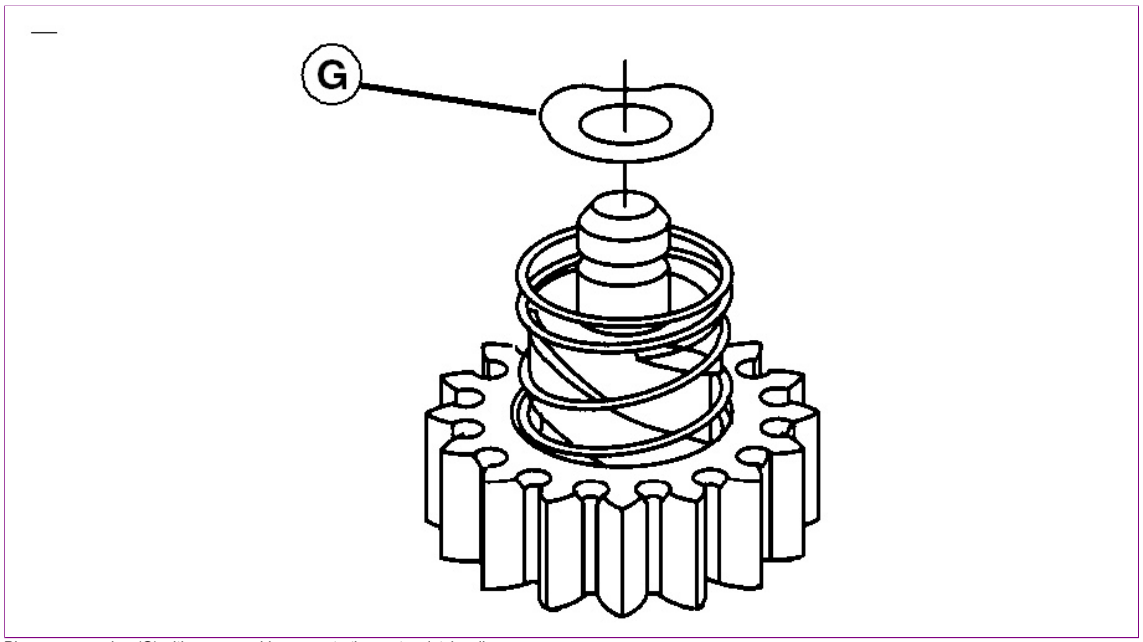
6. Remove retainer (D), wave washer (G), spring (H), pinion gear (I) and starting motor clutch (J).
7. *NOTE:*

   Do not use mineral spirit based lubricants to lubricate helix.

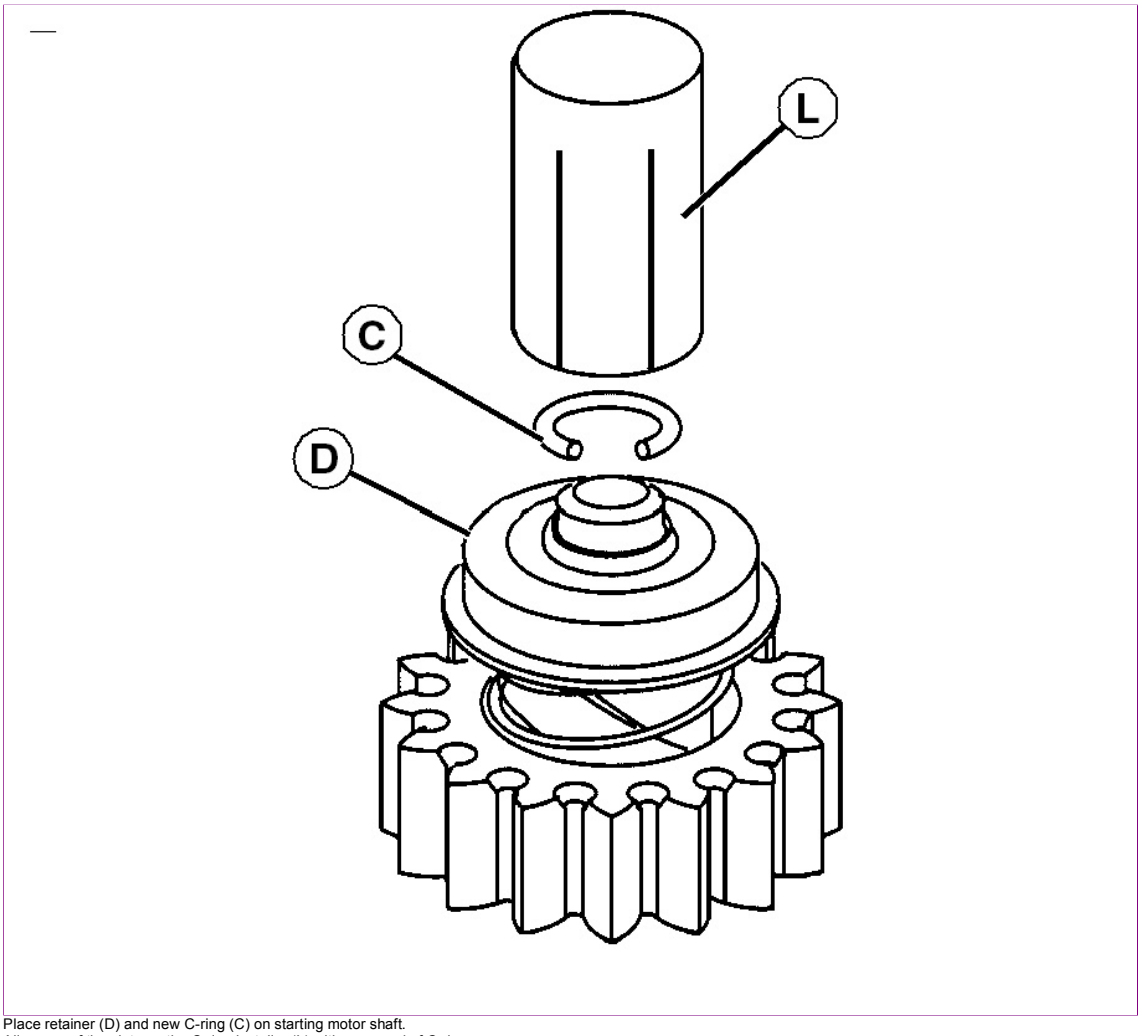
   Before installing pinion gear, apply a lithium based lubricant sparingly around splines (K) on motor clutch (J).
8. Place starting motor clutch on starting motor shaft, rotate clutch until it drops into place.



9. Install pinion gear (I) with beveled side of teeth up, then install return spring (H) making sure spring is in recess of starting motor gear.

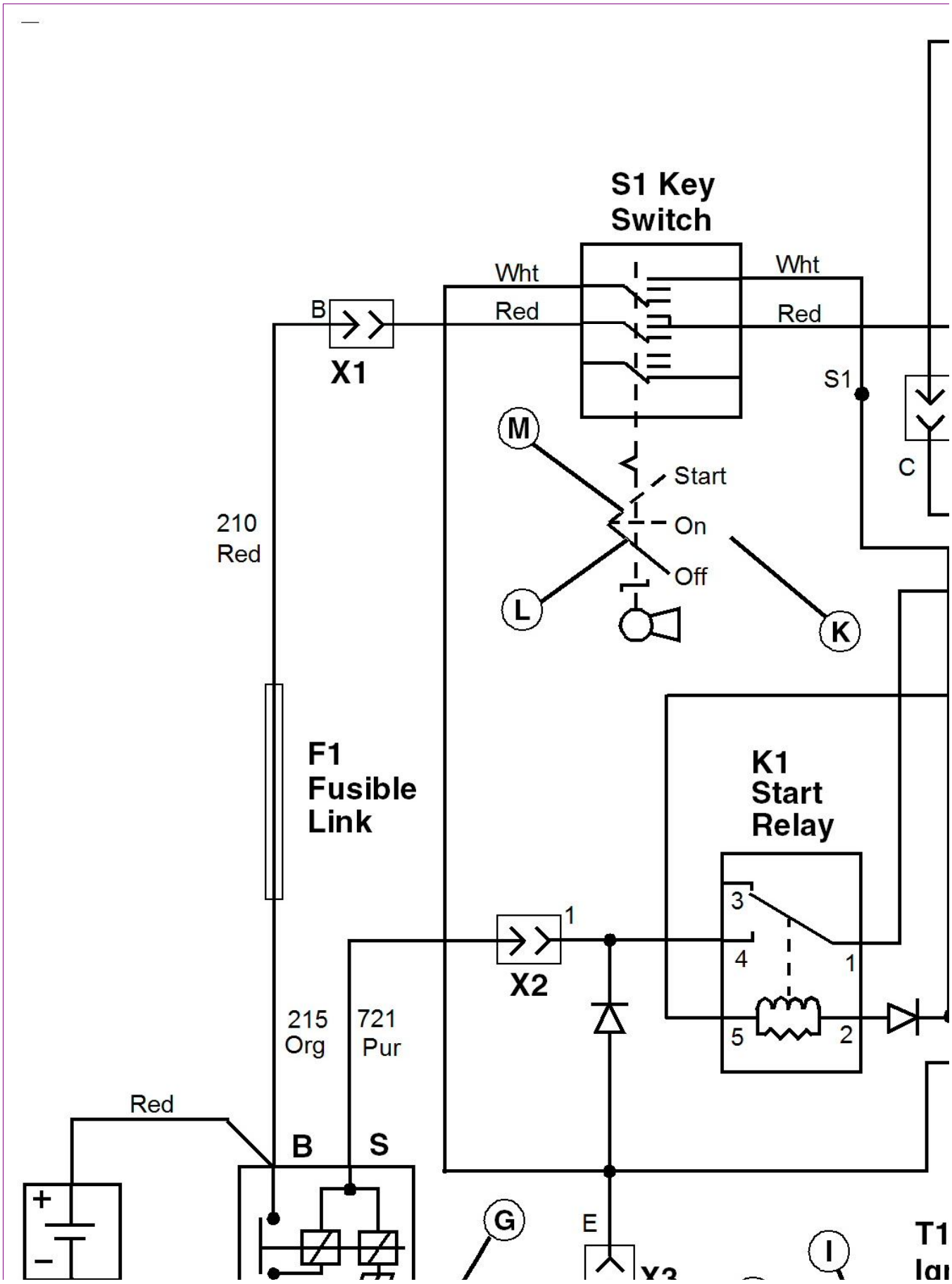


10. Place wave washer (G) with concave side up on starting motor clutch spline.



11. Place retainer (D) and new C-ring (C) on starting motor shaft.
12. Align one of the slots on the C-ring installer (L) with open end of C-ring.
13. Use a hammer to drive snap ring down until it engages groove in starting motor shaft. Then make sure retainer is all the way up against the snap ring.
14. Install flywheel, upper blower housing and reconnect negative (-) battery cable.

Reading Electrical Schematics


S1 Key
Switch
Wht
Red
Wht
Red
B
X1
S1
C
M
Start
On
Off
L
K
210
Red
F1
Fusible
Link
K1
Start
Relay
3
4
1
5
2
1
X2
215
Org
721
Pur
Red
B
S
+
–
G
E
X3
I
T1

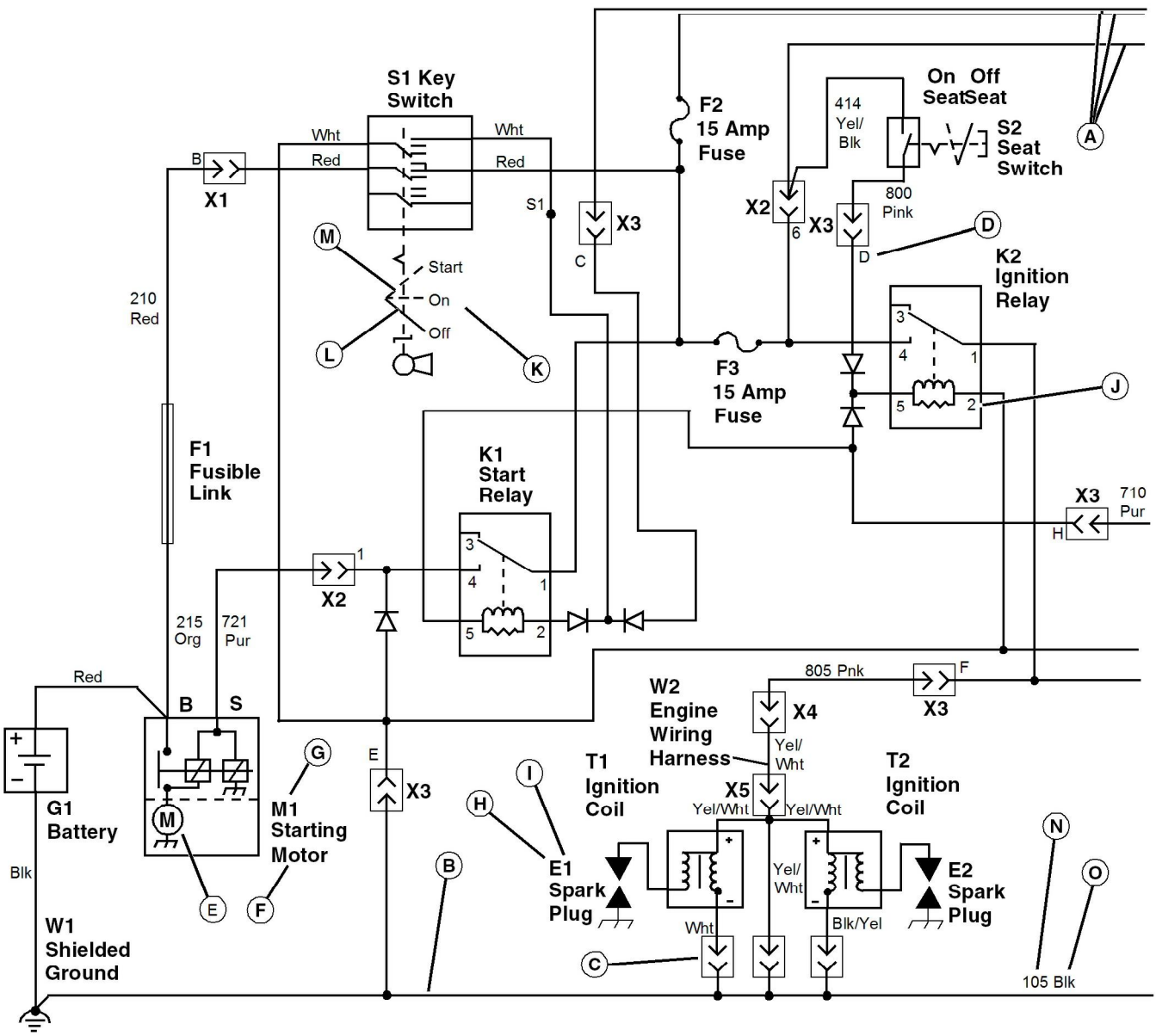
The schematic is made up of individual circuits laid out in a sequence of related functions. It is formatted with all power wires (A) across the top and all ground wires (B) across the bottom. Current flow is generally from top to bottom through each circuit and component. All components are shown in the off position. The diagram does not list connector (C) information unless needed to avoid confusion. If the connector is shown, the number next to it is the terminal pin location (D) in the connector.

Each component is shown by a symbol (E), its name (F), and an identification code (G). The identification code contains a device identifying letter (H) and number (I).

The identifying letter is always the same for a specific component, but the identifying numbers are numbered consecutively from upper left to lower right. The terminal designation (J) is placed directly inside or outside the symbol next to the connecting wire path. Switch positions (K) are also placed directly inside or outside the symbol. The solid line (L) shows the position the switch is currently in and dash lines (M) represent other switch positions.

The circuit number (N) and wire color (O) of the wires are shown directly next to the wire path.

The same component name and identification code are used consistently on all diagrams in this section. Components can be easily cross-referenced.


S1 Key Switch
Wht
Red
Wht
Red
B
X1
S1
X3
C
F2
15 Amp
Fuse
414
Yel/
Blk
On Off
Seat Seat
S2
Seat
Switch
A
X2
6
X3
D
800
Pink
D
K2
Ignition
Relay
3
4
1
5
2
J
M
Start
On
Off
L
K
210
Red
F3
15 Amp
Fuse
F1
Fusible
Link
K1
Start
Relay
X3
710
Pur
H
X2
1
3
4
1
5
2
215
Org
721
Pur
805 Pnk
F
X3
Red
B
S
W2
Engine
Wiring
Harness
X4
Yel/
Wht
T1
Ignition
Coil
X5
Yel/Wht
Yel/Wht
T2
Ignition
Coil
G
E
X3
I
H
G1
Battery
M1
Starting
Motor
M
E
F
E1
Spark
Plug
B
Yel/
Wht
E2
Spark
Plug
N
O
Blk
W1
Shielded
Ground
Wht
Blk/Yel
C
105 Blk

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Theory Of Operation Information

Theory Of Operation Information

The theory of operation stories divide the electrical system into individual circuits by function. Each circuit is isolated from the main wiring schematic and only shows the components that are used in it. The story contains information on function, operating conditions, and theory of operation. The circuit schematics are drawn with the components in the operating position, with the power, or battery positive, into them across the top and the ground, or battery negative, across the bottom.

2000082909382-19-200610110954

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Diagnostic Information

Diagnostic Information

The diagnostic procedures is used to test the complete circuit regardless of the problem or complaint. Select a symptom or system from the quick check or troubleshooting chart and follow the test procedures under that heading.

The diagnostic procedure lists:

- Test conditions
- Test sequence
- Test location
- Normal reading
- Check or test to perform if reading is not normal

When performing the test or check, be sure to set your machine up to the TEST POINT/PROCEDURES listed in the first column and follow the sequence carefully. The middle RESULTS column gives the reading or condition that should be obtained in **BOLD** print. If the results of the test or check are not normal, perform the test, check, or adjustment listed below the **BOLD** print. The system diagram that accompanies each test procedure is drawn to resemble machine components. The leader line points to the exact point the test is to be made.

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Wire Color Abbreviation Chart

Wire Color Abbreviation Chart

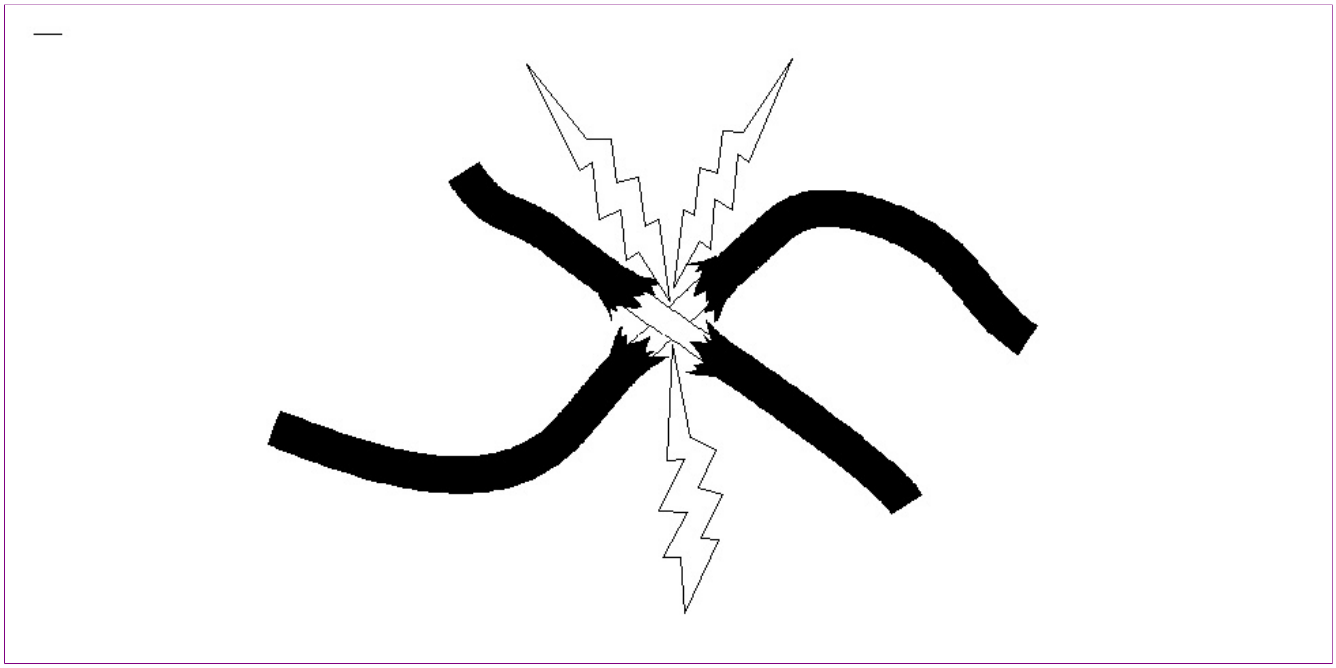
Item	Measurement	Specification
Blk		Black
Blu		Blue
Brn		Brown
Grn		Green
Gry		Gray
Org		Orange
Pnk		Pink
Pur		Purple
Red		Red
Tan		Tan
Wht		White
Yel		Yellow
Blk/Wht		Black/White
Blu/Wht		Blue/White
Brn/Wht		Brown/White
Brn/Yel		Brown/Yellow
Dk Blu		Dark Blue
Dk Brn/Lt Grn		Dark Brown/Light Green
Dk Brn/Red		Dark Brown/Red
Dk Brn/Yel		Dark Brown/Yellow
Dk Grn		Dark Green
Lt Blue		Light Blue
Lt Grn		Light Green
Org/Wht		Orange/White
Pnk/Blk		Pink/Black
Pur/Wht		Purple/White
Red/Blk		Red/Black
Red/Wht		Red/White

Wht/Blk	White/Black
Wht/Red	White/Red
Yel/Blk	Yellow/Black
Yel/Red	Yellow/Red
Yel/Wht	Yellow/White

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Common Circuit Tests

Common Circuit Tests

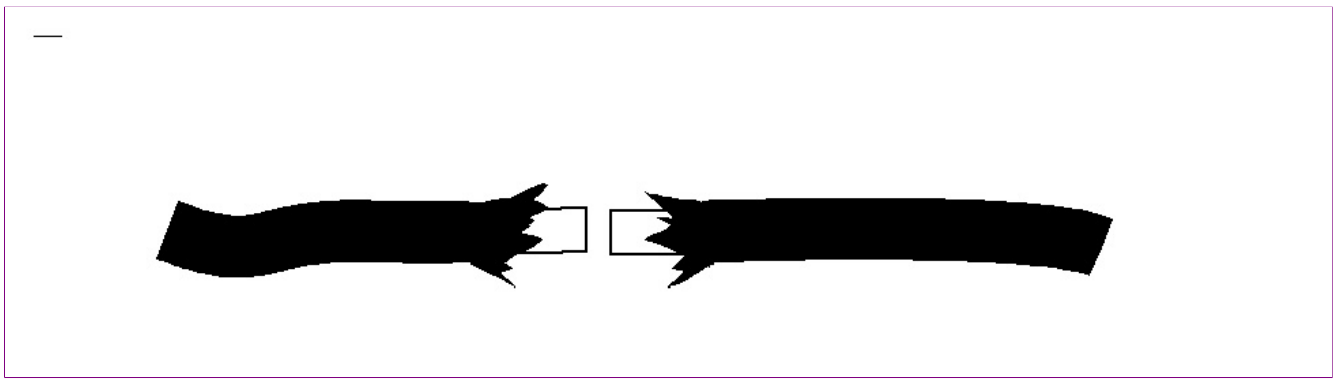
Shorted Circuit:



A shorted circuit may result in the wrong component operating (i.e. improper wire-to-wire contact). To test for a shorted or improperly wired circuit:

1. Turn component switch ON.
2. Start at the controlling switch of the component that should not be operating.
3. Follow the circuit and disconnect wires at connectors until component stops operating.
4. Shorted or improper connections will be the last two wires disconnected.

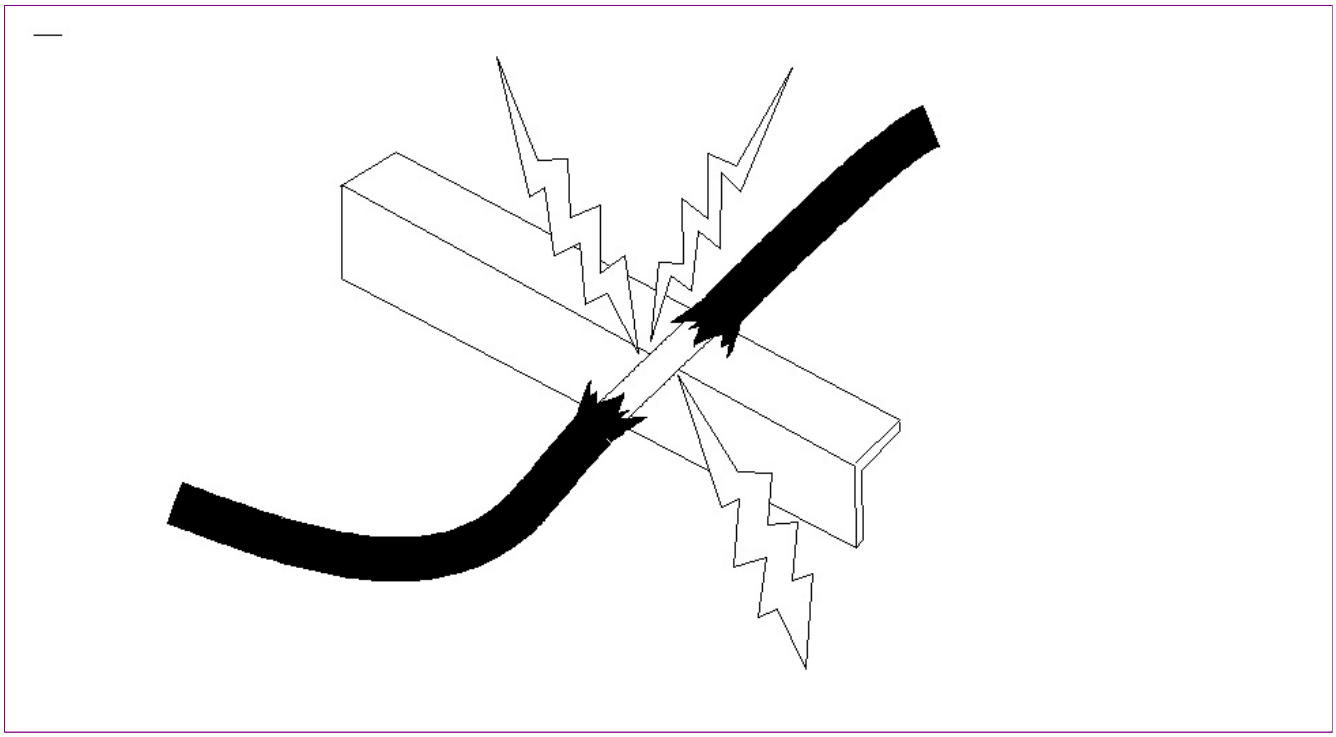
High Resistance or Open Circuit:



High resistance or open circuits usually result in slow, dim or no component operation (i.e. poor, corroded, or disconnected connections). Voltage at the component will be low when the component is in operation. To test for high resistance and open circuits:

1. Check all terminals and grounds of the circuit for corrosion.
2. If terminals are not corroded or loose, the problem is in the component or wiring.

Grounded Circuit:



Grounded circuits usually result in no component operation or a blown fuse.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Conductors For 12 Volt Circuits

Conductors For 12 Volt Circuits

Stranded Conductors For 12 Volt Circuits						
Sae Wire Size (Gauge)	20	18	16	14	12	10
Metric Wire Size (mm)	0.5	0.8	1.0	2.0	3.0	5.0
Typical Stranding	7 X 28	16 X 30	19 X 29	19 X 27	19 X 25	19 X 23
Minimum Conductor Area In Circular Mils	1072	1537	2336	3702	5833	9343

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Electrical

Electrical

Item	Measurement	Specification
Battery:		
Voltage		12 VDC
Battery Type		BCI Group U1

Item	Measurement	Specification
Ignition:		
Spark Plug		Champion RC12YC
Spark Plug Gap		0.76 mm 0.030 in.)
Spark Plug Torque		20 N•m 180 lb-in.)
Ignition Module Air gap		0.2 - 0.3 mm 0.008 - 0.012 in.)

Item	Measurement	Specification
Starting Motor:		
Type		Inertia Drive
Starting motor amp draw (on machine)		90 - 100 amps
Starting motor no-load amp draw (free running)		35 amps (maximum)

Item	Measurement	Specification
Stator - LA105/115/125/135/145:		
Size		8 amp
Regulated Amperage (Minimum) at Fast Idle		3 - 8 amps
Unregulated Voltage (Minimum) at Fast idle		40 volts AC

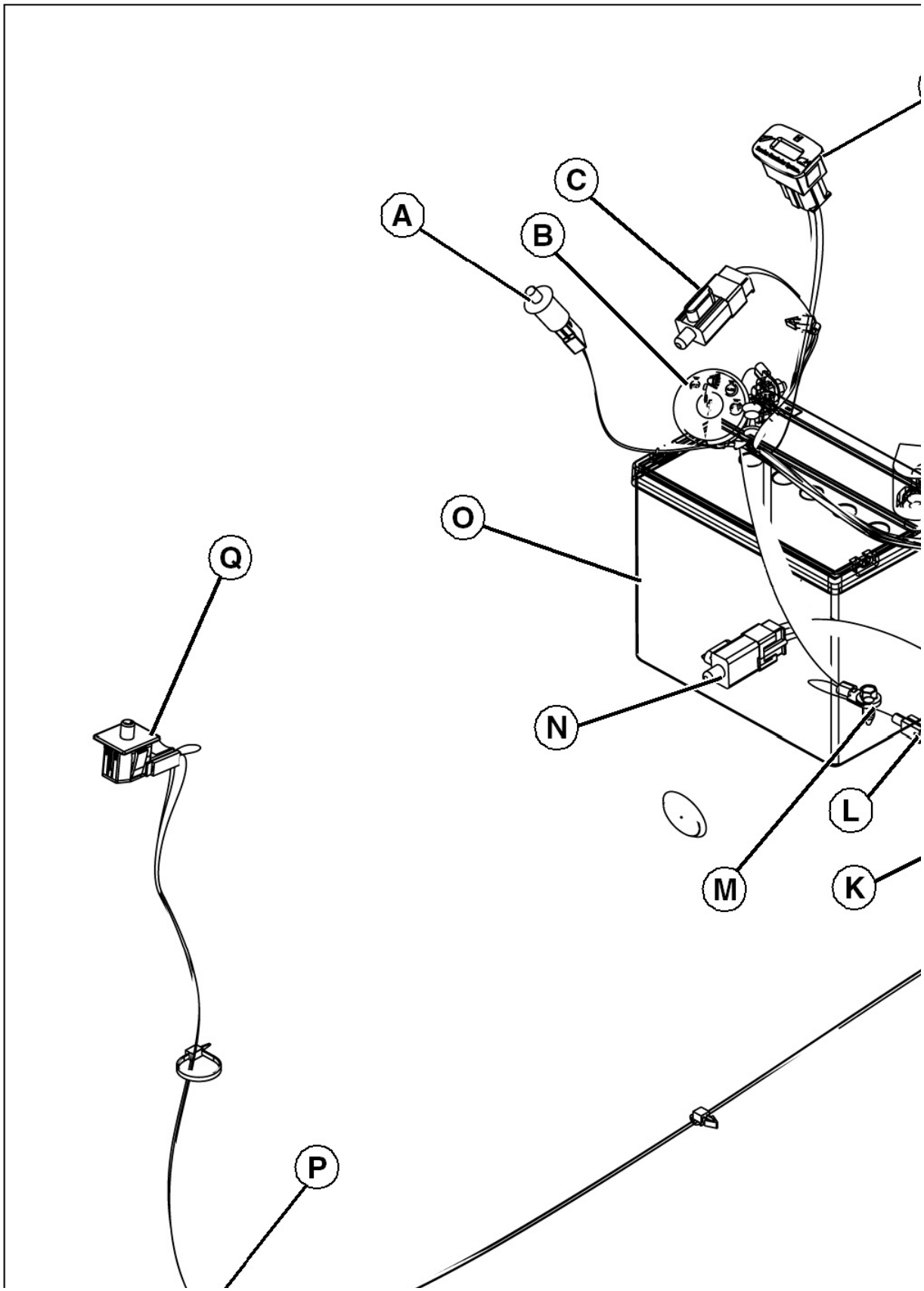
Item	Measurement	Specification
Stator - LA165/175:		
Size		14 amp

Regulated Amperage (Minimum) at Fast Idle		3 - 14amp
Unregulated Voltage (Minimum) at Fast idle		30 volts AC

Item	Measurement	Specification
Electric PTO Clutch - LA145/165/175:		
Resistance		3.7 ohms
Current Draw		3.25 amps

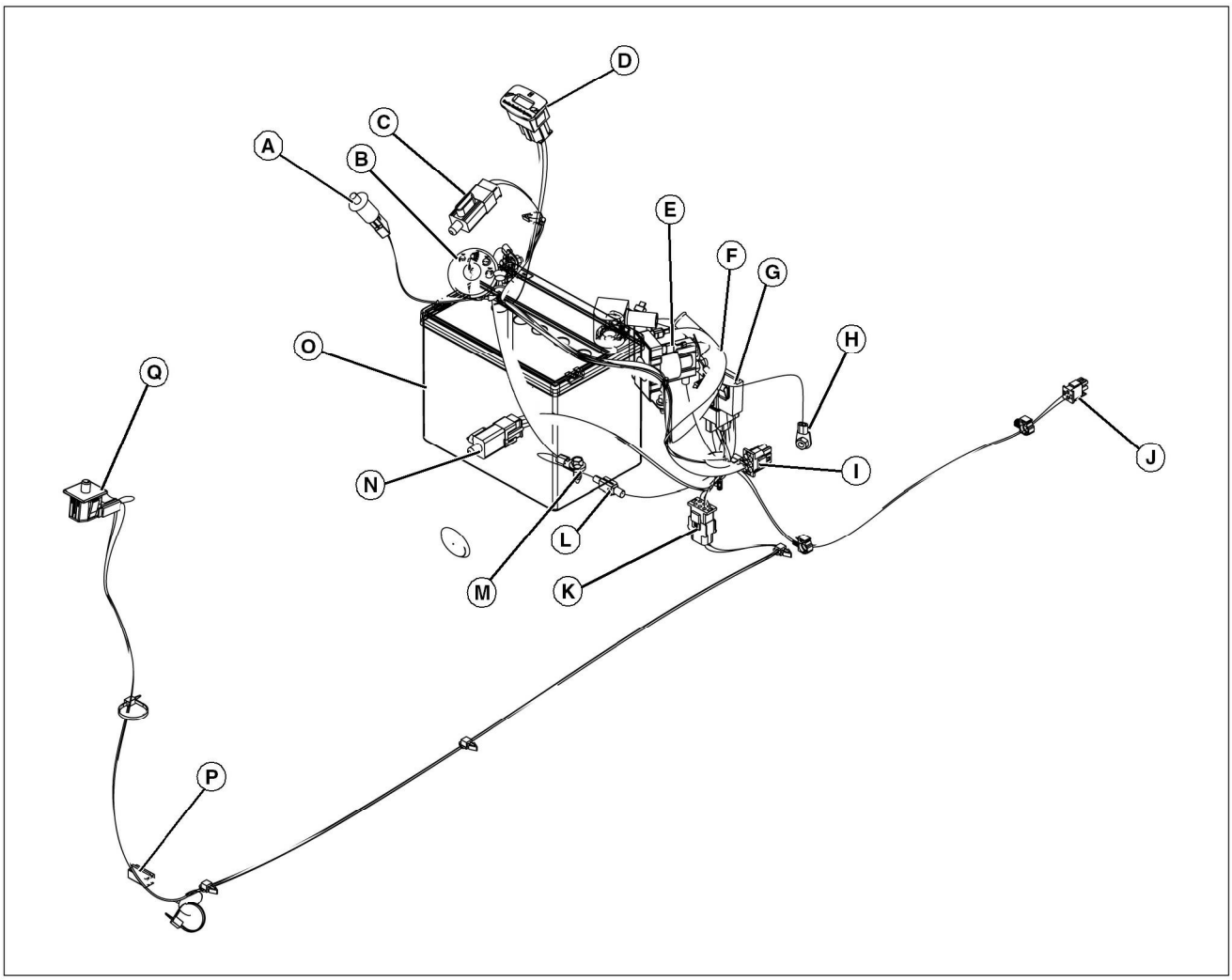
Item	Measurement	Specification
Lighting:		
Headlights		GE 1156 or equivalent

Component Location - LA105/115/125/135

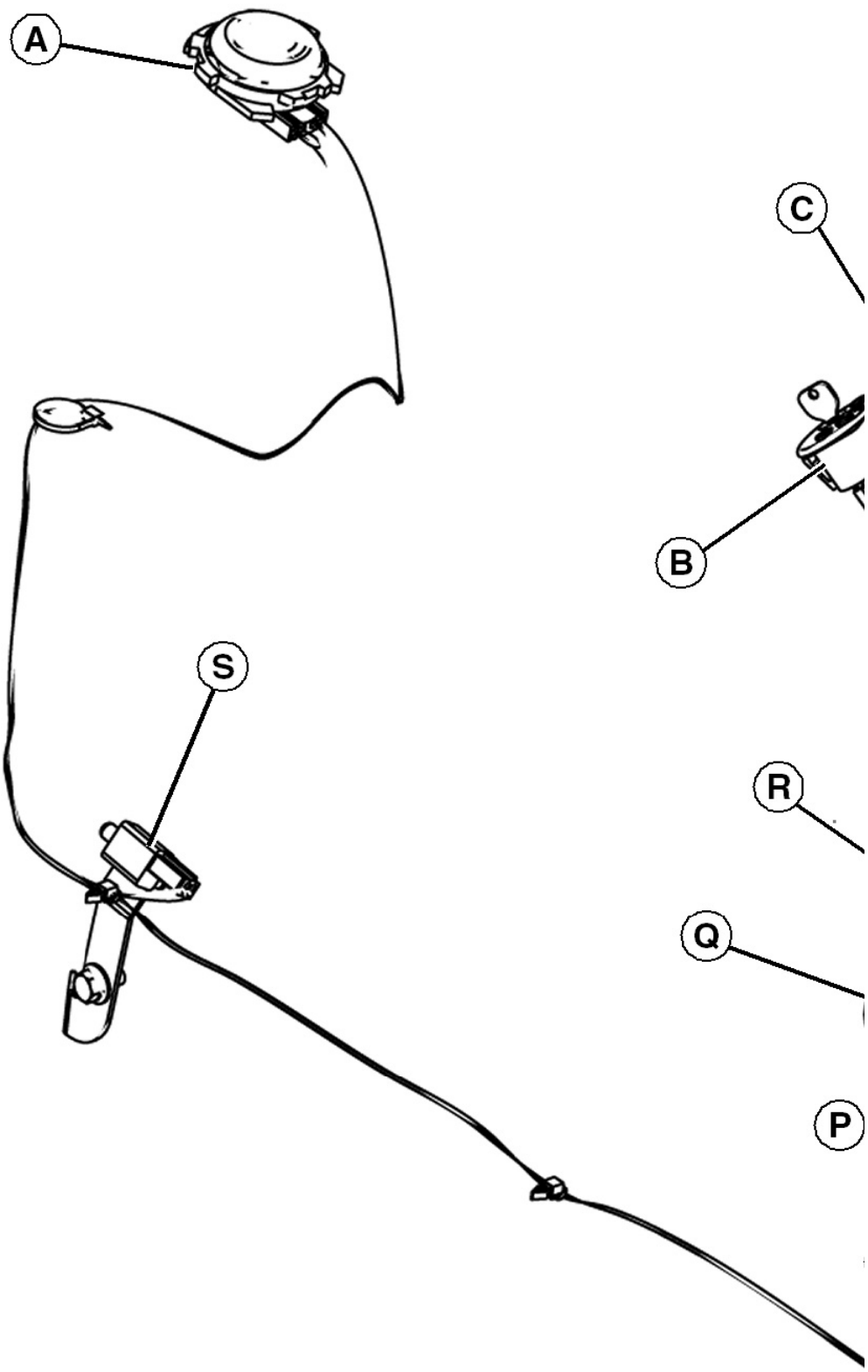

A
B
C
O
Q
N
L
M
K
P

LEGEND:

A - S4 RIS Switch
B - S1 Key Switch
C - S2 PTO Switch
D - P1 Hour Meter/Service Indicator
E - Y1 Starting Motor Solenoid
F - K1 RIO Latch Relay
G - F1 Fuse
H - M1 Starter
I - X6 Engine Wiring Harness Connector
J - X4 Headlight Connector
K - X5 Rear Wiring Harness Connector
L - X2 Ground Connector
M - W1 Ground
N - S3 Brake Switch
O - G1 Battery
P - S6 RIO Switch
Q - S5 Seat Switch

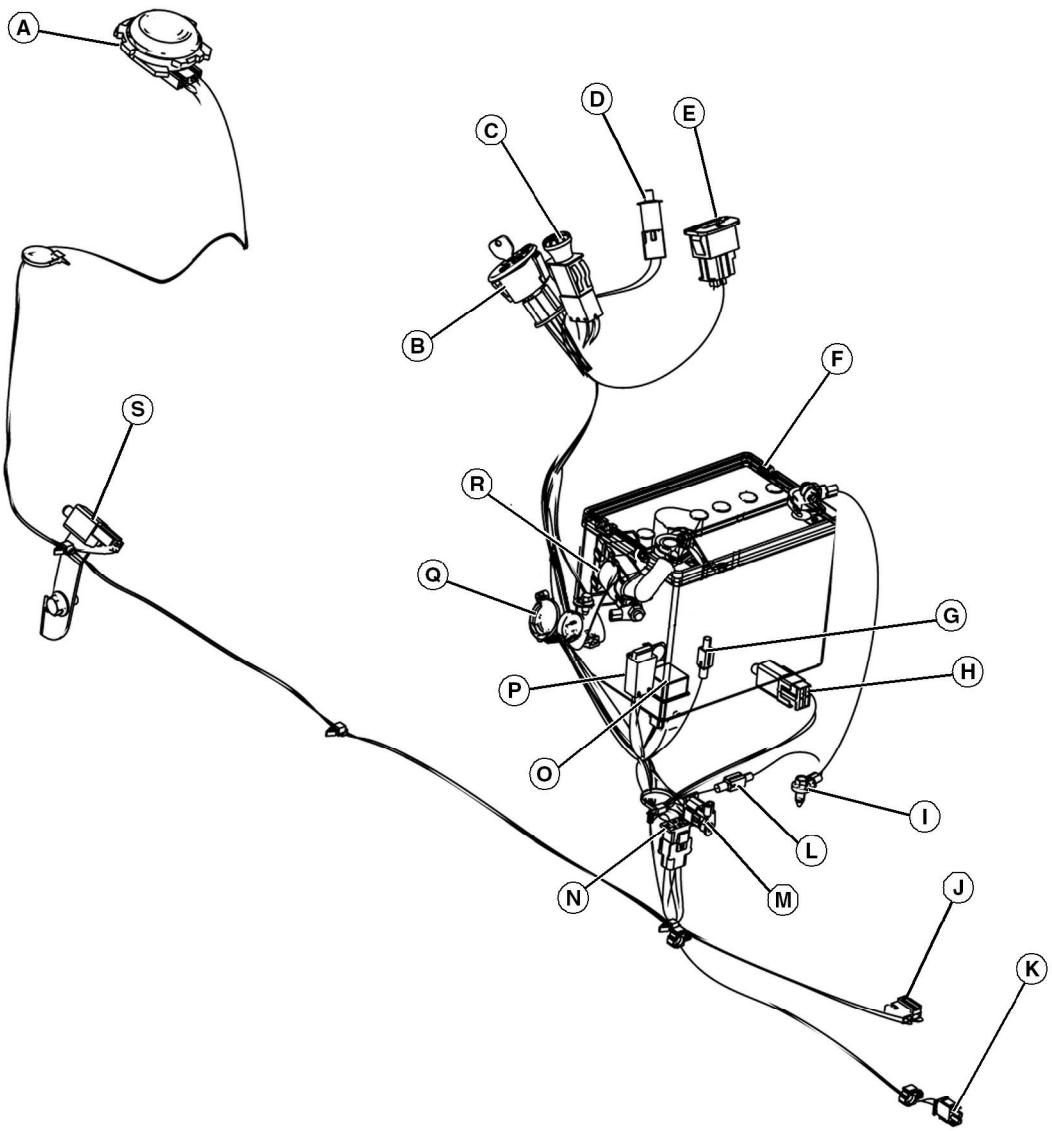

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q

Component Location - LA145/155/165/175


A
C
B
S
R
Q
P

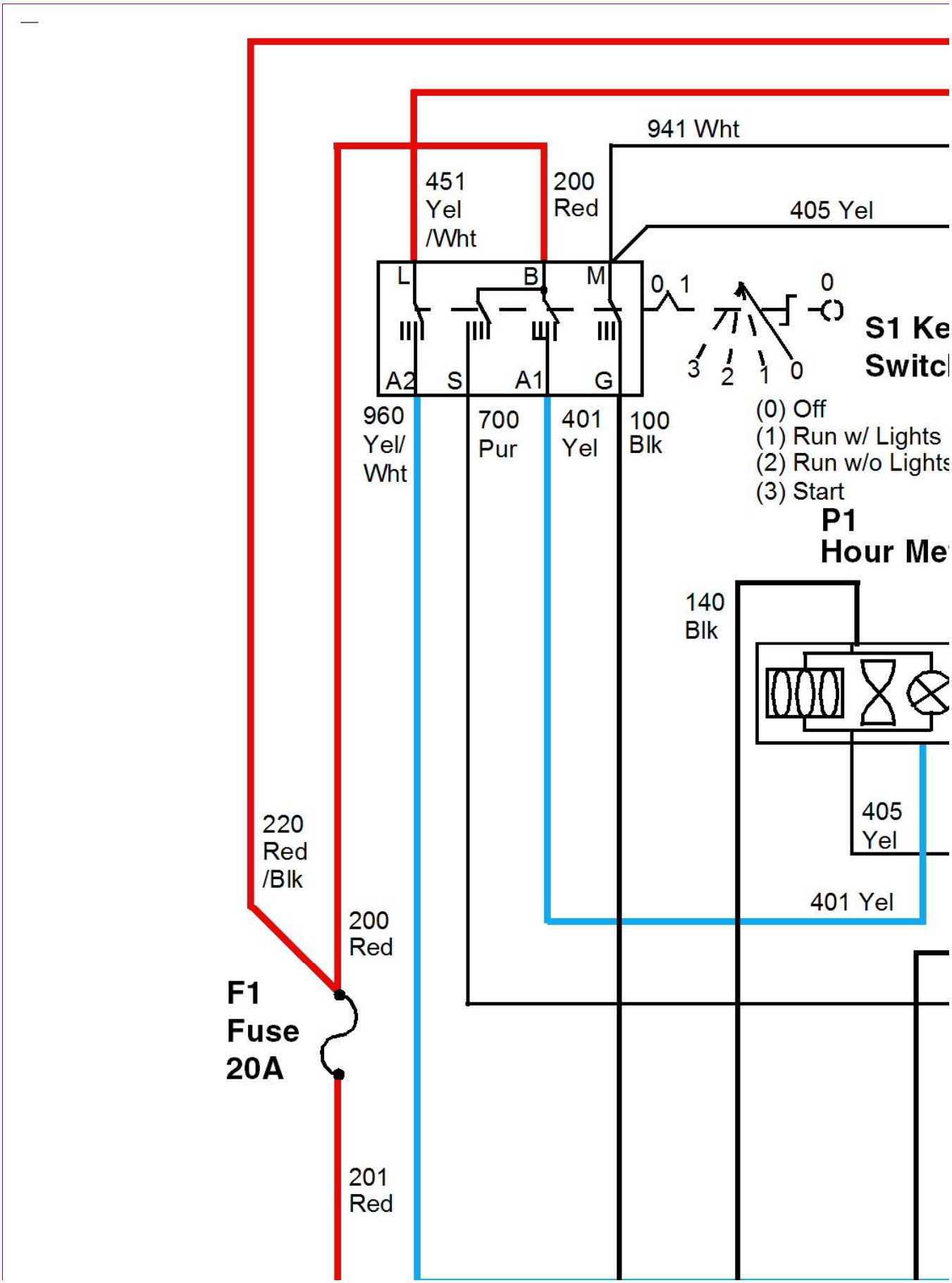
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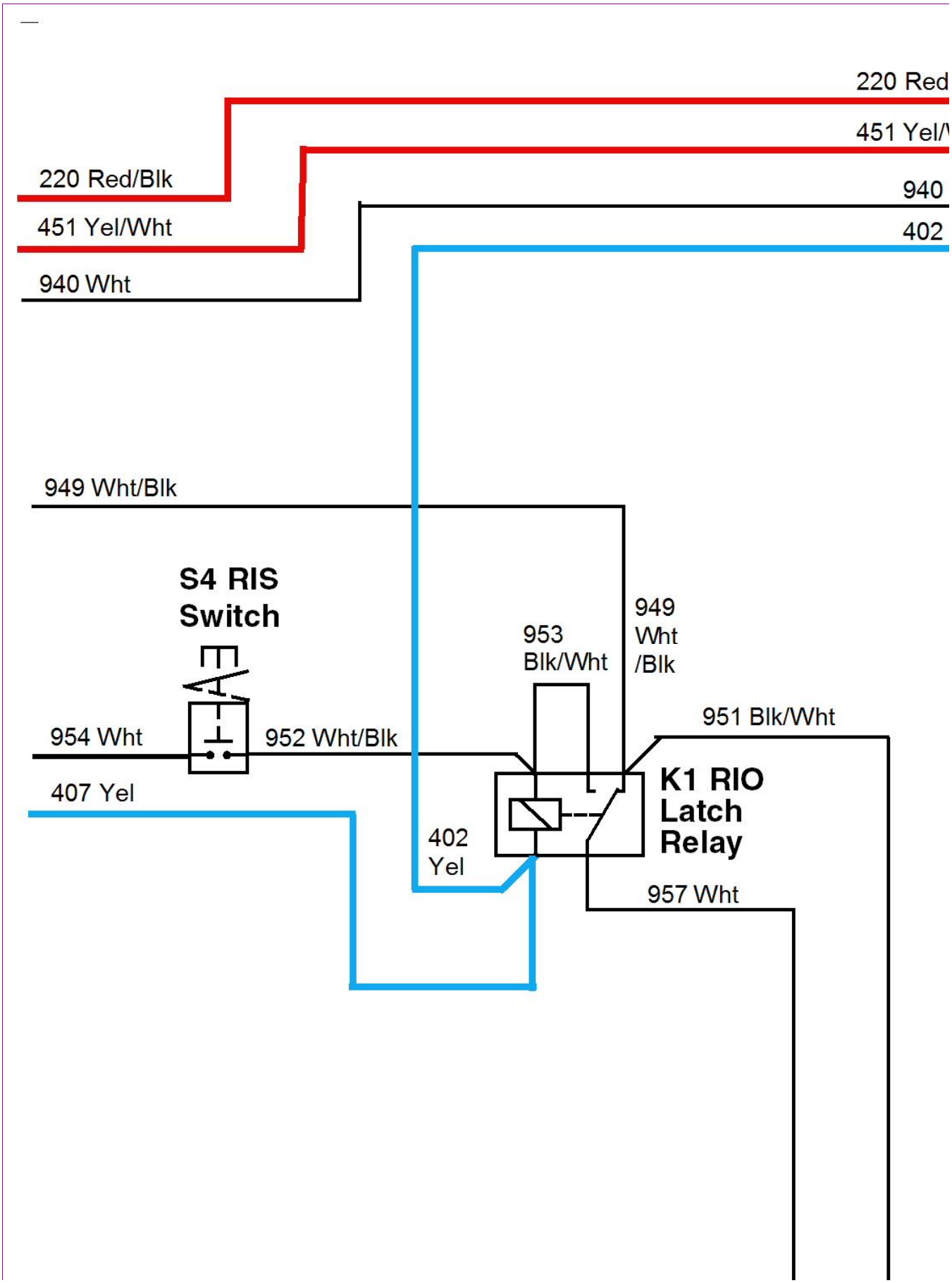
A - S5 Seat Switch
B - S1 Key Switch
C - S2 PTO Switch
D - S4 RIS Switch
E - P1 Hour Meter/Service Indicator
F - G1 Battery
G - X1 Power Connector
H - S3 Brake Switch
I - W1 Ground
J - Y3 PTO Clutch Connector
K - X4 Headlight Connector
L - X2 Ground Connector
M - M1 Starting Motor
N - X5 Connector
O - L1 RIO Latch Relay
P - F1 Fuse
Q - X3 Power Port (Not used on LA145, 155)
R - Y1 Starting Solenoid
S - S6 RIO Switch

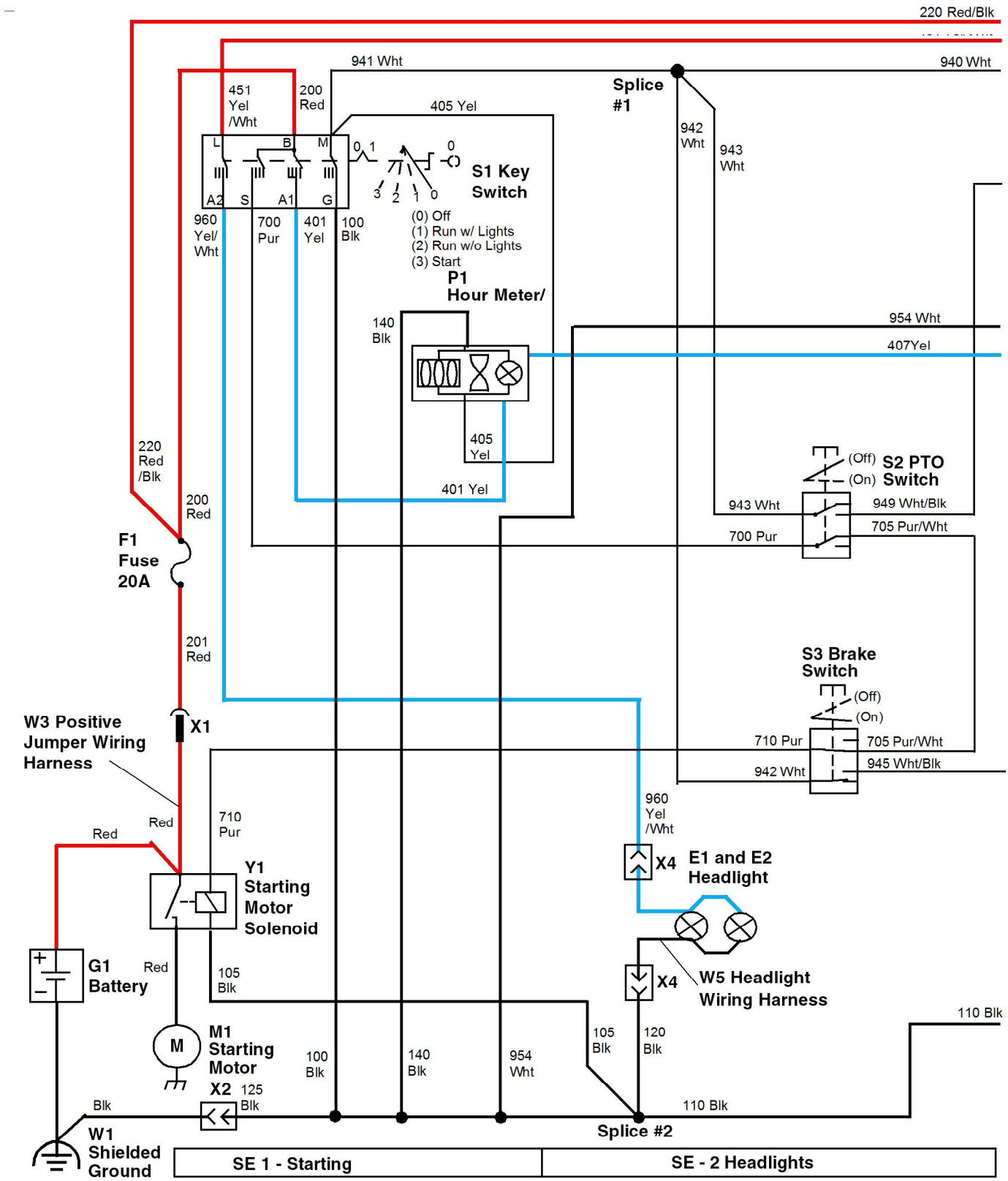

A
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P
Q
R
S

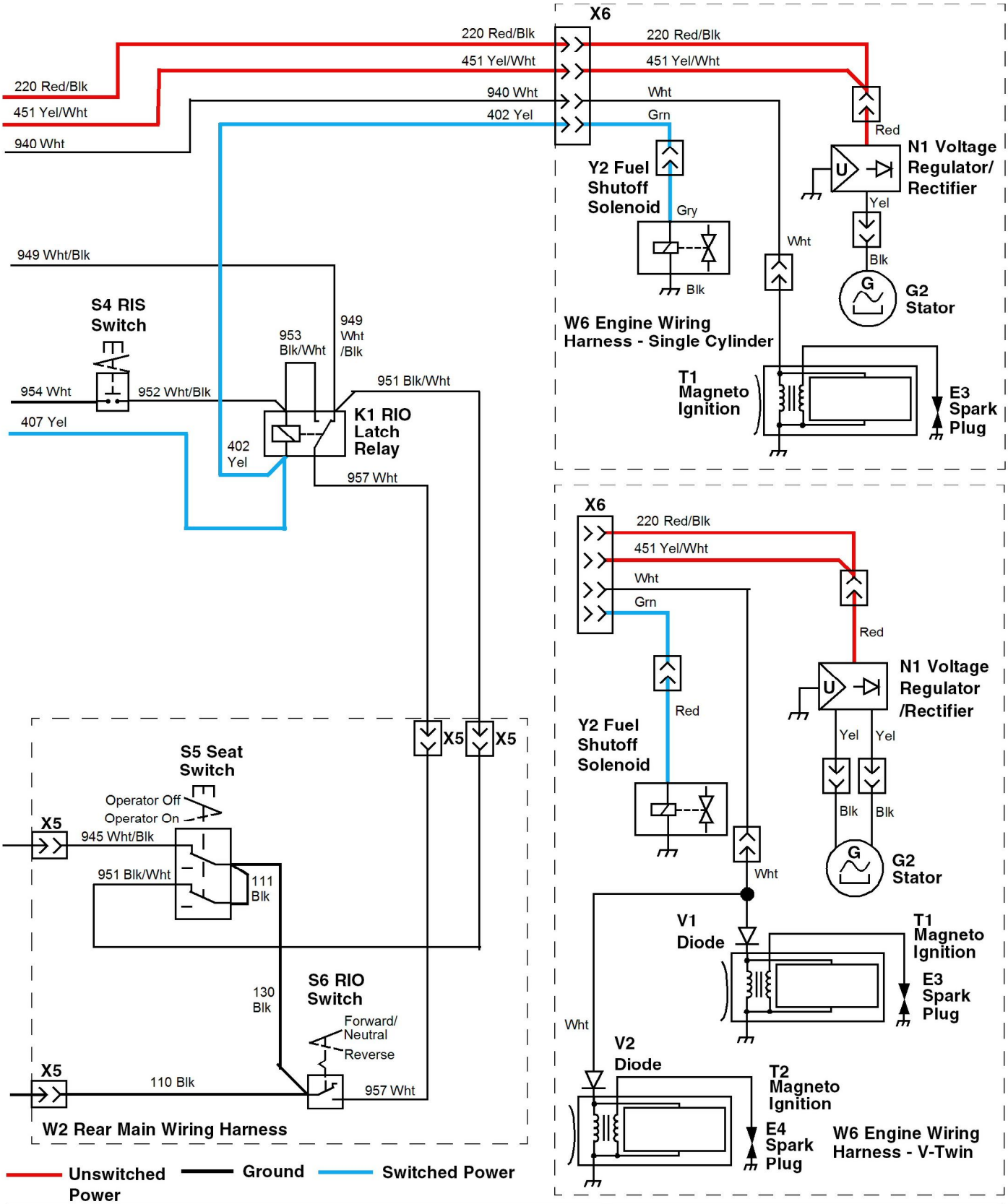
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Main Wiring Schematic LA105/115/125/135

Main Wiring Schematic LA105/115/125/135


941 Wht
451
Yel
/Wht
200
Red
405 Yel
L
B
M
0 1
0
3 2 1 0
S1 Ke
Switc
A2
S
A1
G
960
Yel/
Wht
700
Pur
401
Yel
100
Blk
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
P1
Hour Me
140
Blk
405
Yel
401 Yel
220
Red
/Blk
200
Red
F1
Fuse
20A
201
Red


220 Red
451 Yel/
220 Red/Blk
940
451 Yel/Wht
402
940 Wht
949 Wht/Blk
S4 RIS
Switch
949
Wht
/Blk
953
Blk/Wht
951 Blk/Wht
954 Wht
952 Wht/Blk
K1 RIO
Latch
Relay
407 Yel
402
Yel
957 Wht


220 Red/Blk
941 Wht
940 Wht
Splice #1
451 Yel /Wht
200 Red
405 Yel
942 Wht
943 Wht
L
B
M
A2
S
A1
G
0 1
3 2 1 0
S1 Key Switch
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
960 Yel/ Wht
700 Pur
401 Yel
100 Blk
P1 Hour Meter/
140 Blk
954 Wht
407Yel
405 Yel
401 Yel
220 Red /Blk
200 Red
F1 Fuse 20A
201 Red
(Off)
(On)
S2 PTO Switch
943 Wht
949 Wht/Blk
705 Pur/Wht
700 Pur
S3 Brake Switch
(Off)
(On)
710 Pur
705 Pur/Wht
942 Wht
945 Wht/Blk
W3 Positive Jumper Wiring Harness
X1
Red
Red
710 Pur
960 Yel /Wht
X4
E1 and E2 Headlight
Y1 Starting Motor Solenoid
G1 Battery
Red
105 Blk
X4
W5 Headlight Wiring Harness
110 Blk
M
M1 Starting Motor
X2
125 Blk
100 Blk
140 Blk
954 Wht
105 Blk
120 Blk
Blk
110 Blk
W1 Shielded Ground
Splice #2
SE 1 - Starting
SE - 2 Headlights



SE 3 - Magneto Kill & Start Interlock	SE 4 - Engine Ignition/Charging

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Schematic and Wiring Harness Legend - LA105/115/125/135

Schematic and Wiring Harness Legend - LA105/115/125/135

E1 - RH Headlight (SE2, W1)

E2 - LH Headlight (SE2, W1)

E3 - Spark Plug (SE4, W6)

E4 - Spark Plug (SE4, W6) (V-Twins Only)

F1 - Fuse 20 Amp (SE1, W1)

G1 - Battery (SE1, W1)

G2 - Stator (SE4, W6)

K1 - RIO Latch Relay (SE3, W1)

M1 - Starting Motor (SE1, W1)

N1 - Voltage Regulator/Rectifier (SE4, W6)

P1 - Hour Meter (SE1, W1)

S1 - Key Switch (SE1, W1)

S2 - PTO Switch (SE3, W1)

S3 - Brake Switch (SE3, W1)

S4 - RIS Switch (SE3, W1)

S5 - Seat Switch (SE3, W1)

S6 - RIO Switch (SE3, W1)

T1 - Magneto Ignition (SE4, W6)

T2 - Magneto Ignition (SE4, W6) (V-Twins only))

V1 - Diode (SE4, W6) (V-Twins Only)

V2 - Diode (SE4, W6) (V-Twins Only)

W1 - Shielded Ground (SE1, W1)

Y1 - Starting Motor Solenoid (SE1, W1)

Y2 - Fuel Shutoff Solenoid (SE4, W6)

Connectors:

X1 - W1 Front Main Wiring Harness to W3 Positive Jumper Wiring Harness (SE1, W1)

X2 - W1 Front Main Wiring Harness to W4 Negative Jumper Wiring Harness (SE1, W1)

X4 - W1 Front Main Wiring Harness to W5 Headlight Wiring Harness (SE2, W1)

X5 - W1 Front Main Wiring Harness to W2 Rear Main Wiring Harness (SE3, W1)

X6 - W1 Front Main Wiring Harness to W6 Engine Wiring Harness (SE3, W1)

Wiring Harnesses:

W1 - Front Main Wiring Harness

W2 - Rear Main Wiring Harness

W3 - Positive Jumper Wiring Harness

W4 - Negative Jumper Wiring Harness

W5 - Headlight Wiring Harness

W6 - Engine Wiring Harness

W7 - Positive Jumper Cable

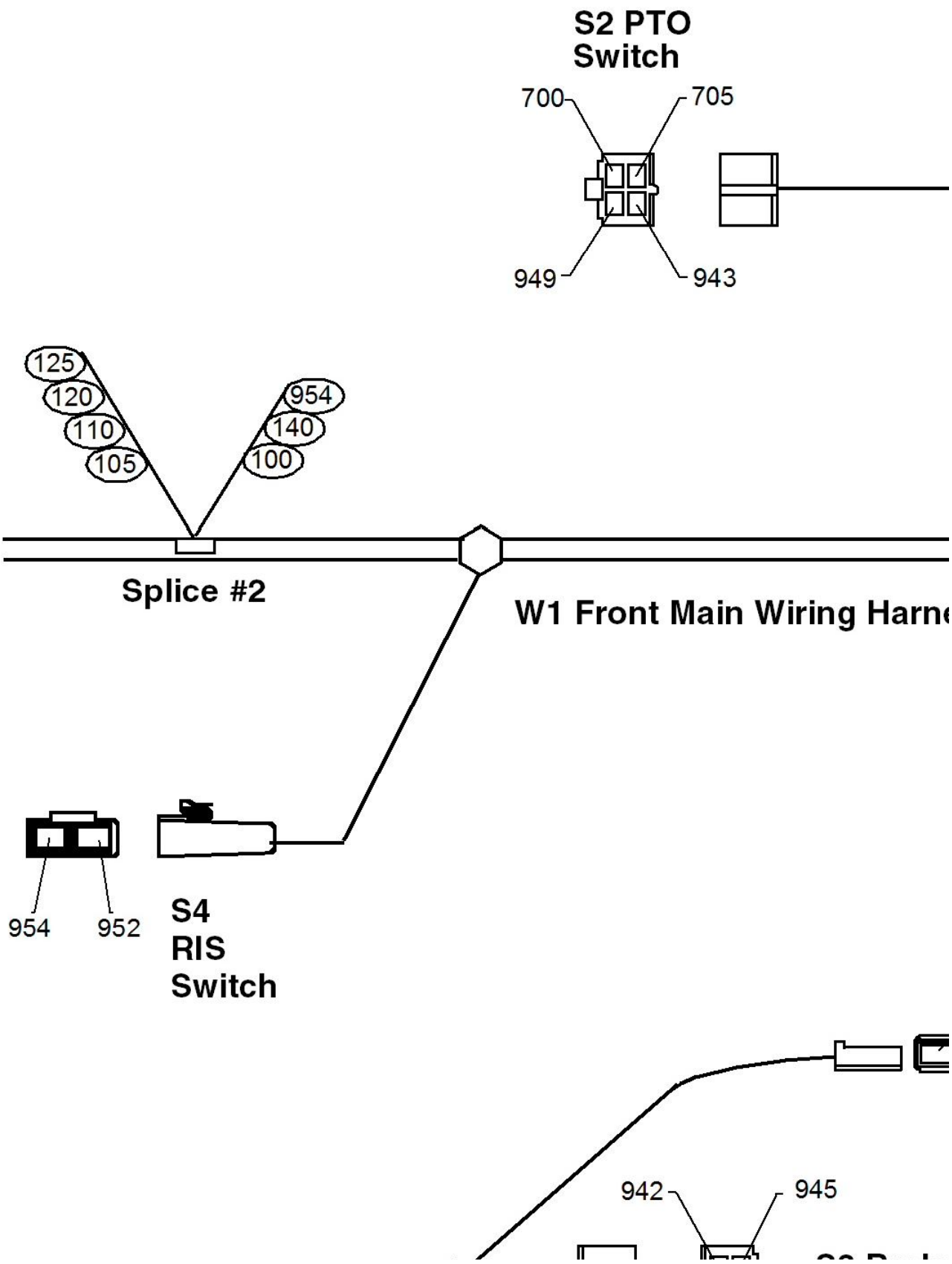
W1 and W2 Main Wiring Harnesses LA105/115/125/135

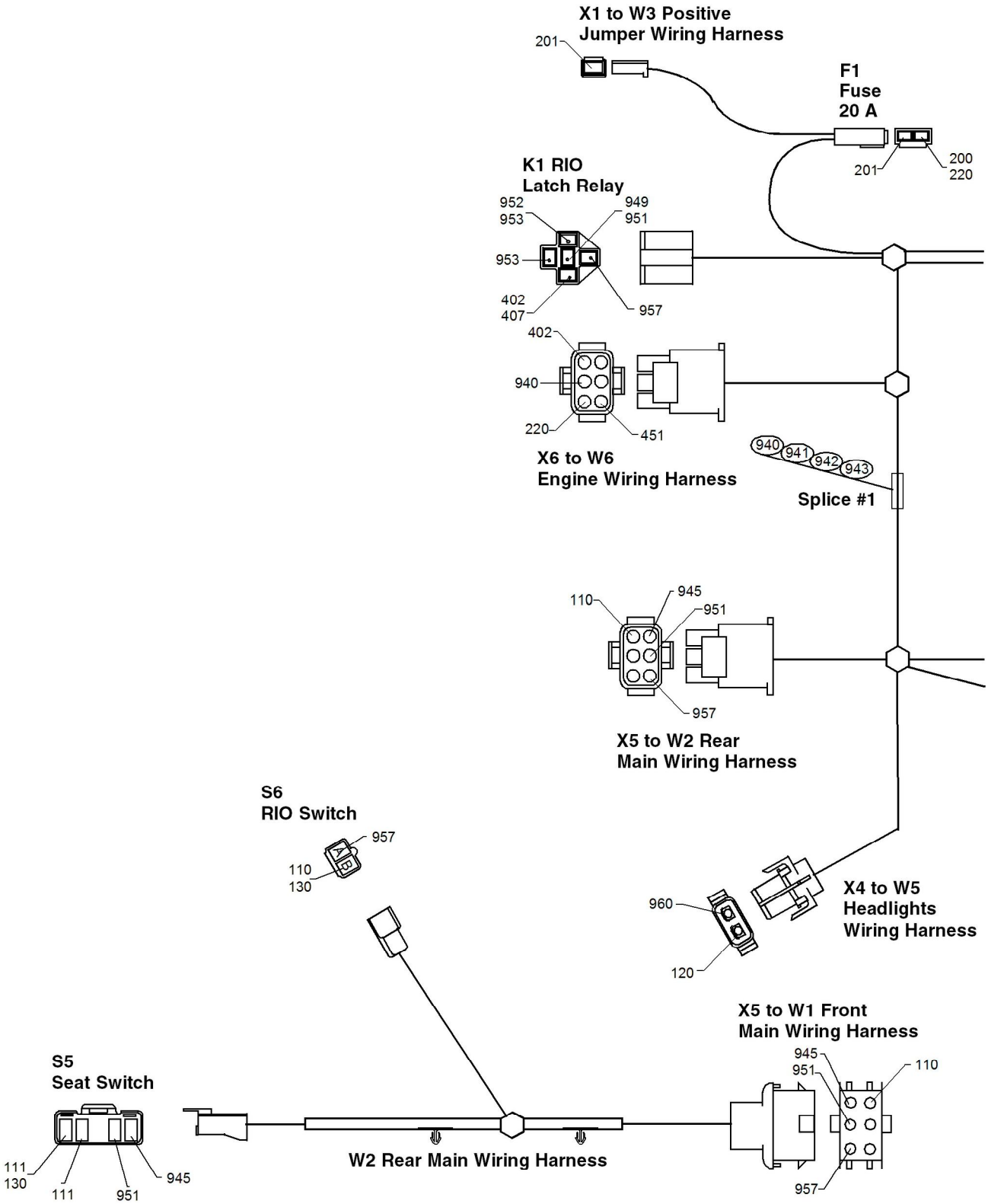
—

95
95

95

40
40


S2 PTO
Switch
700
705
949
943
125
120
110
105
954
140
100
Splice #2
W1 Front Main Wiring Harne
954
952
S4
RIS
Switch
942
945


X1 to W3 Positive
Jumper Wiring Harness
201
F1
Fuse
20 A
201
200
220
K1 RIO
Latch Relay
952
953
949
951
953
402
407
957
402
940
220
451
X6 to W6
Engine Wiring Harness
940
941
942
943
Splice #1
110
945
951
957
X5 to W2 Rear
Main Wiring Harness
S6
RIO Switch
957
110
130
960
120
X4 to W5
Headlights
Wiring Harness
X5 to W1 Front
Main Wiring Harness
945
951
110
957
S5
Seat Switch
111
130
111
951
945
W2 Rear Main Wiring Harness

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
W1 Front Main Wire Harness Color Codes - LA105/115/125/135

W1 Front Main Wire Harness Color Codes - LA105/115/125/135

Size/No./Color	Wire Connection Points
0.5 100 Blk	S1, Splice #2
0.5 105 Blk	Y1, Splice #2
0.8 110 Blk	Splice #2, X5
0.5 120 Blk	Splice #2, X4
1.0 125 Blk	Splice #2, X2
0.5 140 Blk	P1, Spice #2
1.0 200 Red	F1, S1
1.0 201 Red	X1, F1
1.0 220 Red/Blk	F1, X6
0.8 401 Yel	S1, P1
0.5 402 Yel	K1, X6
0.5 405 Yel	S1, P1
0.5 451 Yel/Wht	S1, X6
0.5 700 Pur	S1, S2
0.5 705 Pur/Wht	S2, S3
0.5 710 Pur	S3, Y1
0.5 940 Wht	Splice #1, X6
0.5 941 Wht	Splice #1, S1
0.5 942 Wht	Splice #1, S3
0.5 943 Wht	Splice #1, S2
0.5 945 Wht/Blk	S3, X5
0.5 949 Wht/Blk	K1, S2
0.5 951 Blk/Wht	X5, K1
0.5 952 Wht/Blk	K1, S4
0.5 953 Blk/Wht	K1, K1
0.5 954 Wht	S4, Splice #2
0.5 957 Wht	K1, X5
0.5 960 Yel/Wht	S1, X4

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
W2 Rear Main Wire Harness Color Codes - LA105/115/125/135

W2 Rear Main Wire Harness Color Codes - LA105/115/125/135

Size/No./Color	Wire Connection Points
0.5 110 Blk	S6, X5
0.5 111 Blk	S5, S5
0.5 130 Blk	S5, S6
0.5 945 Wht/Blk	X5, S5
0.5 951 Blk/Wht	S5, X5
0.5 957 Wht	S6, X5

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Schematic And Wiring Harness Legend - LA145/155/165/175

Schematic And Wiring Harness Legend - LA145/155/165/175

E1 - RH Headlight (SE2, W1)

E2 - LH Headlight (SE2, W1)

E3 - Spark Plug (SE4, W6)

E4 - Spark Plug (SE4, W6)

F1 - Fuse 20 Amp (SE1, W1)

G1 - Battery (SE1, W1)

G2 - Stator (SE4, W6)

K1 - RIO Latch Relay (SE3, W1)

M1 - Starting Motor (SE1, W1)

N1 - Voltage Regulator/Rectifier (SE4, W6)

P1 - Hourmeter (SE1, W1)

S1 - Key Switch (SE1, W1)

S2 - PTO Switch (SE3, W1)

S3 - Brake Switch (SE3, W1)

S4 - RIS Switch (SE3, W1)

S5 - Seat Switch (SE3, W1)

S6 - RIO Switch (SE3, W1)

T1 - Magneto Ignition (SE4, W6)

T2 - Magneto Ignition (SE4, W6)

V1 - Diode (SE4, W6)

V2 - Diode (SE4, W6)

W1 - Shielded Ground (SE1, W1)

Y1 - Starting Motor Solenoid (SE1, W1)

Y2 - Fuel Shutoff Solenoid (SE4, W6)

Y3 - PTO Clutch (SE3, W2)

Connectors:

X1 - W1 Front Main Wiring Harness to W3 Positive Jumper Wiring Harness (SE1, W1)

X2 - W1 Front Main Wiring Harness to W4 Negative Jumper Wiring Harness (SE1, W1)

X3 - W1 Front Main Wiring Harness to Power Port (SE1, W1) - Not used on LA145, 155

X4 - W1 Front Main Wiring Harness to W5 Headlight Wiring Harness (SE2, W1)

X5 - W1 Front Main Wiring Harness to W2 Rear Main Wiring Harness (SE3, W1)

X6 - W1 Front Main Wiring Harness to W6 Engine Wiring Harness (SE3, W1)

Wiring Harnesses:

W1 - Front Main Wiring Harness

W2 - Rear Main Wiring Harness

W3 - Positive Jumper Wiring Harness

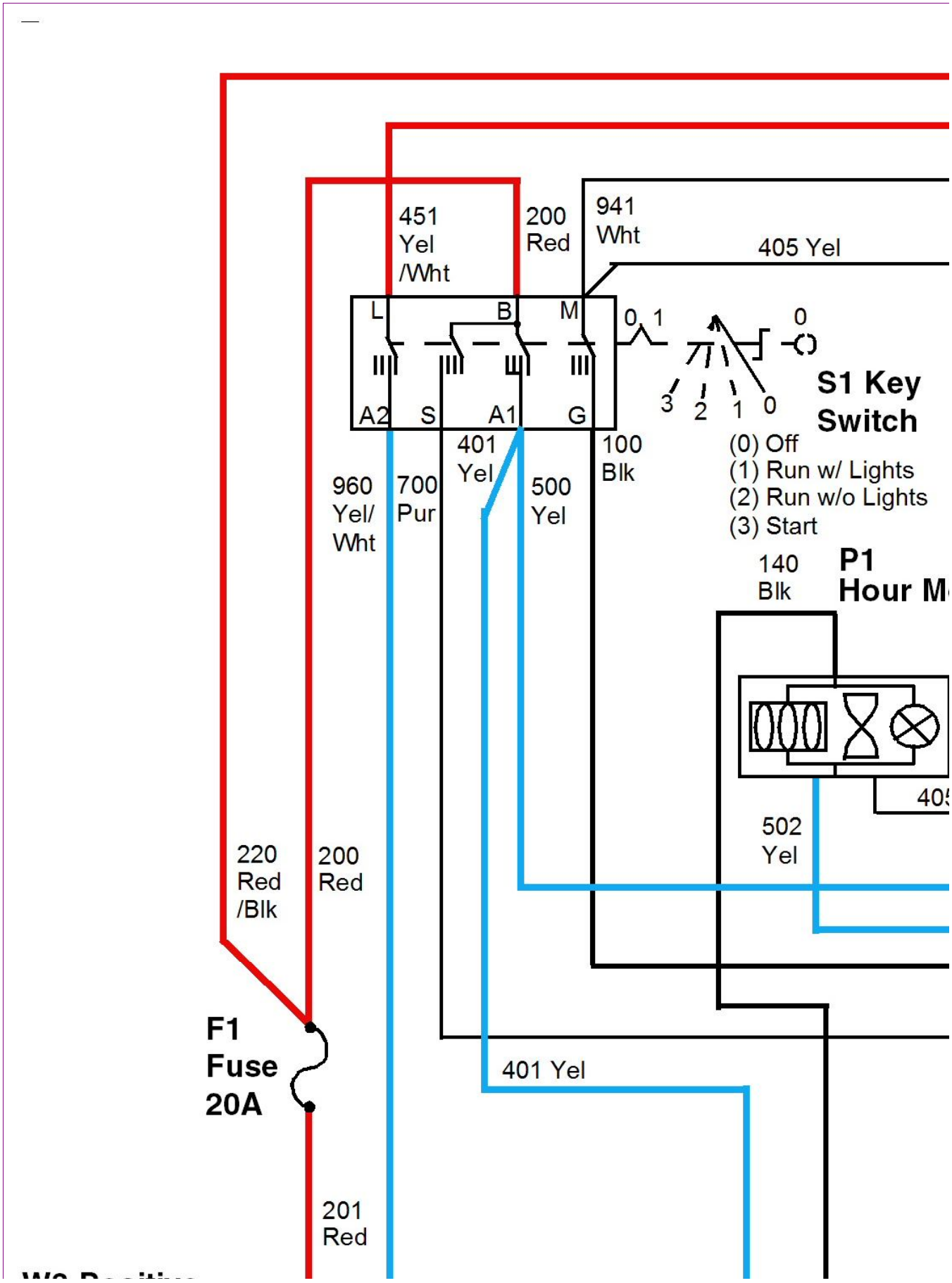
W4 - Negative Jumper Wiring Harness

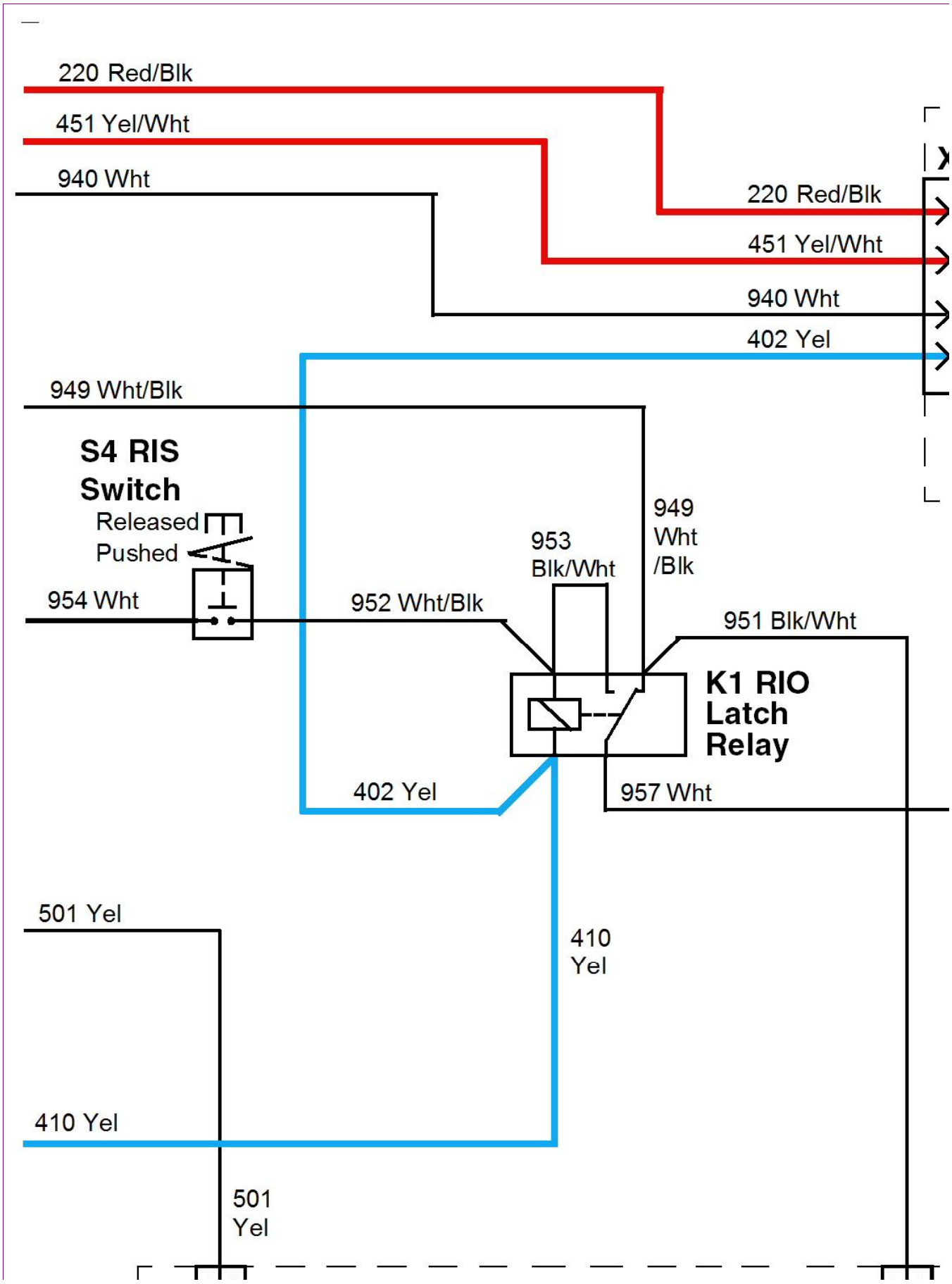
W5 - Headlight Wiring Harness

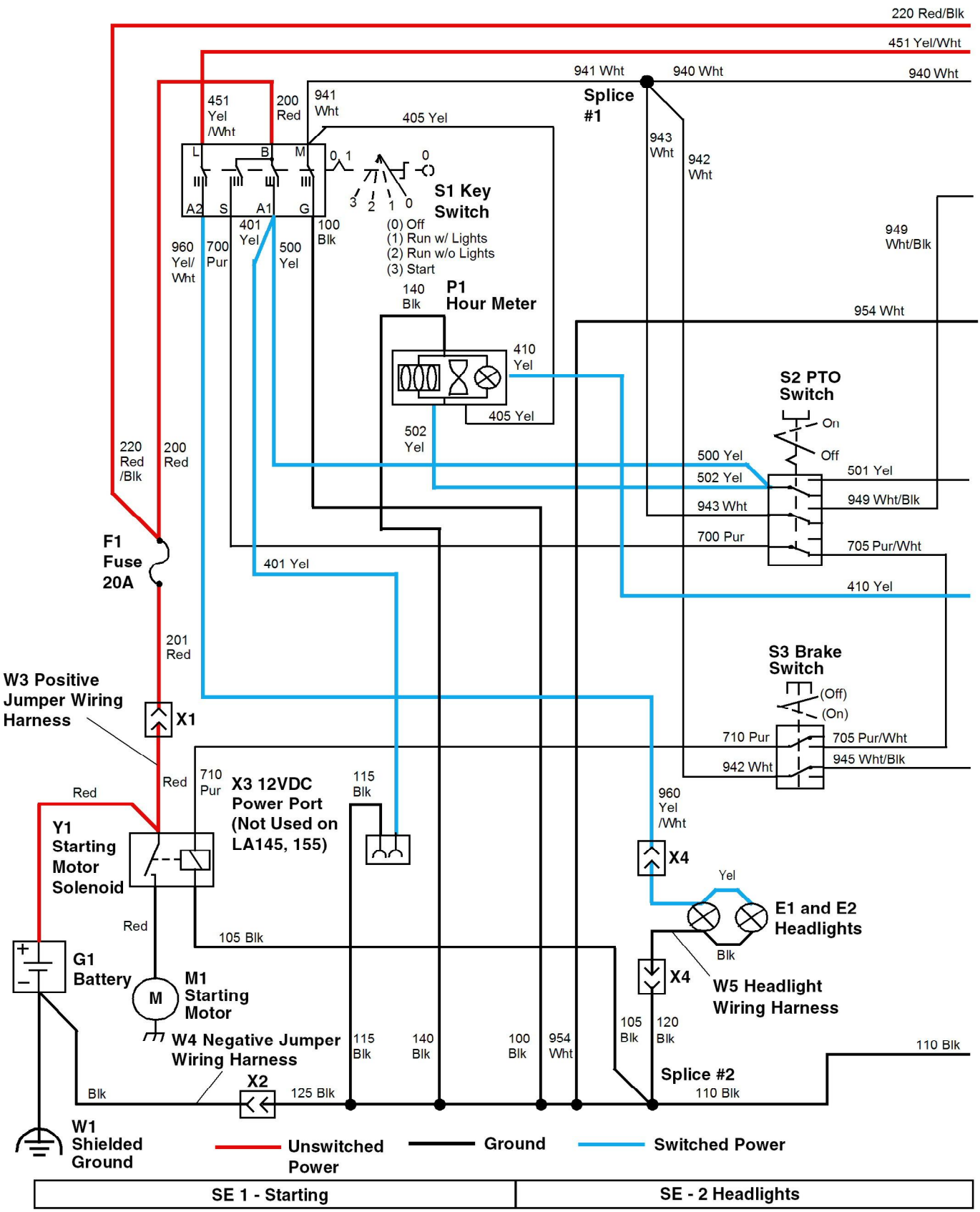
W6 - Engine Wiring Harness

W7 - Positive Jumper Cable

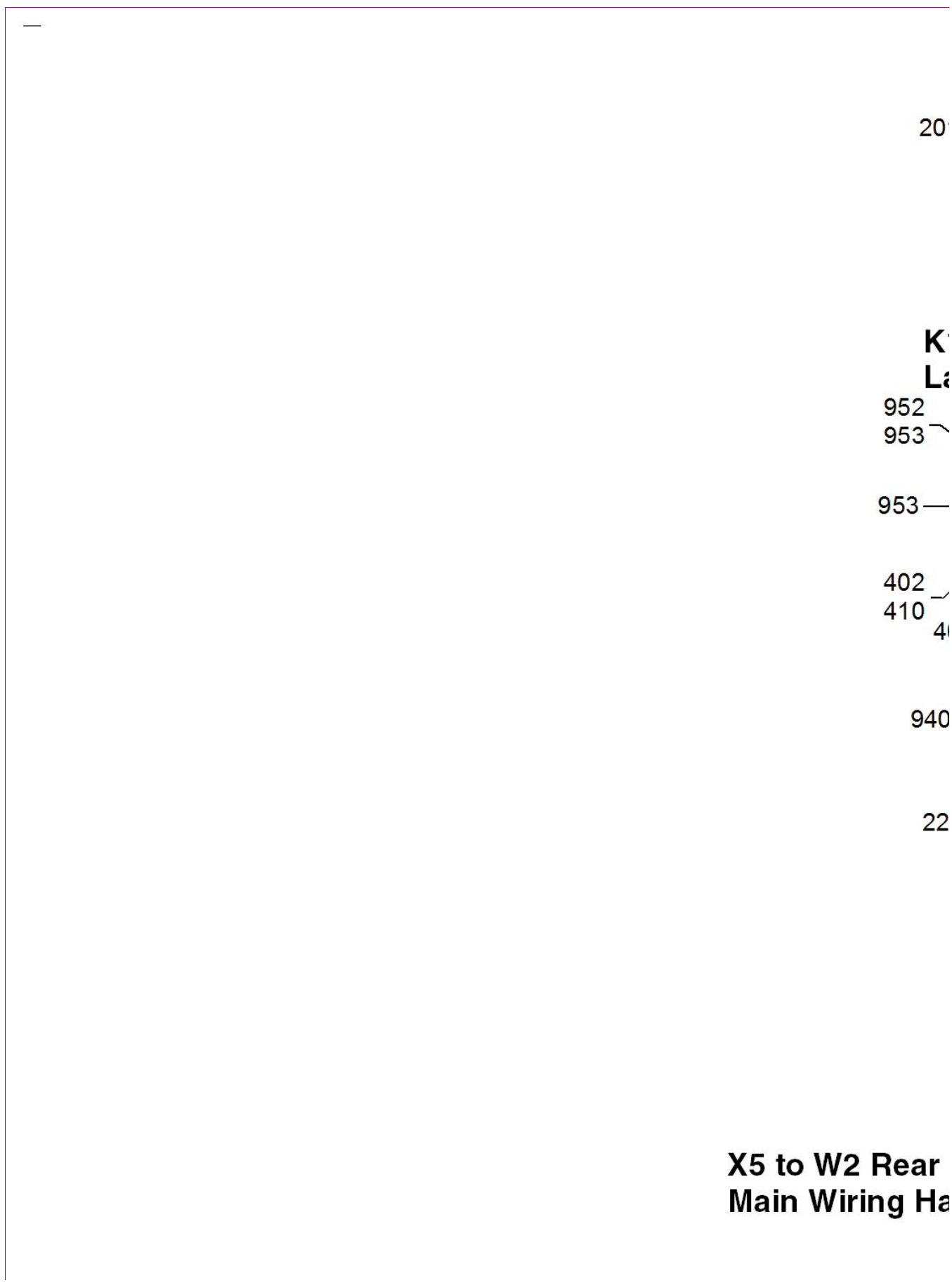
Main Wiring Schematic - LA145/155/165/175

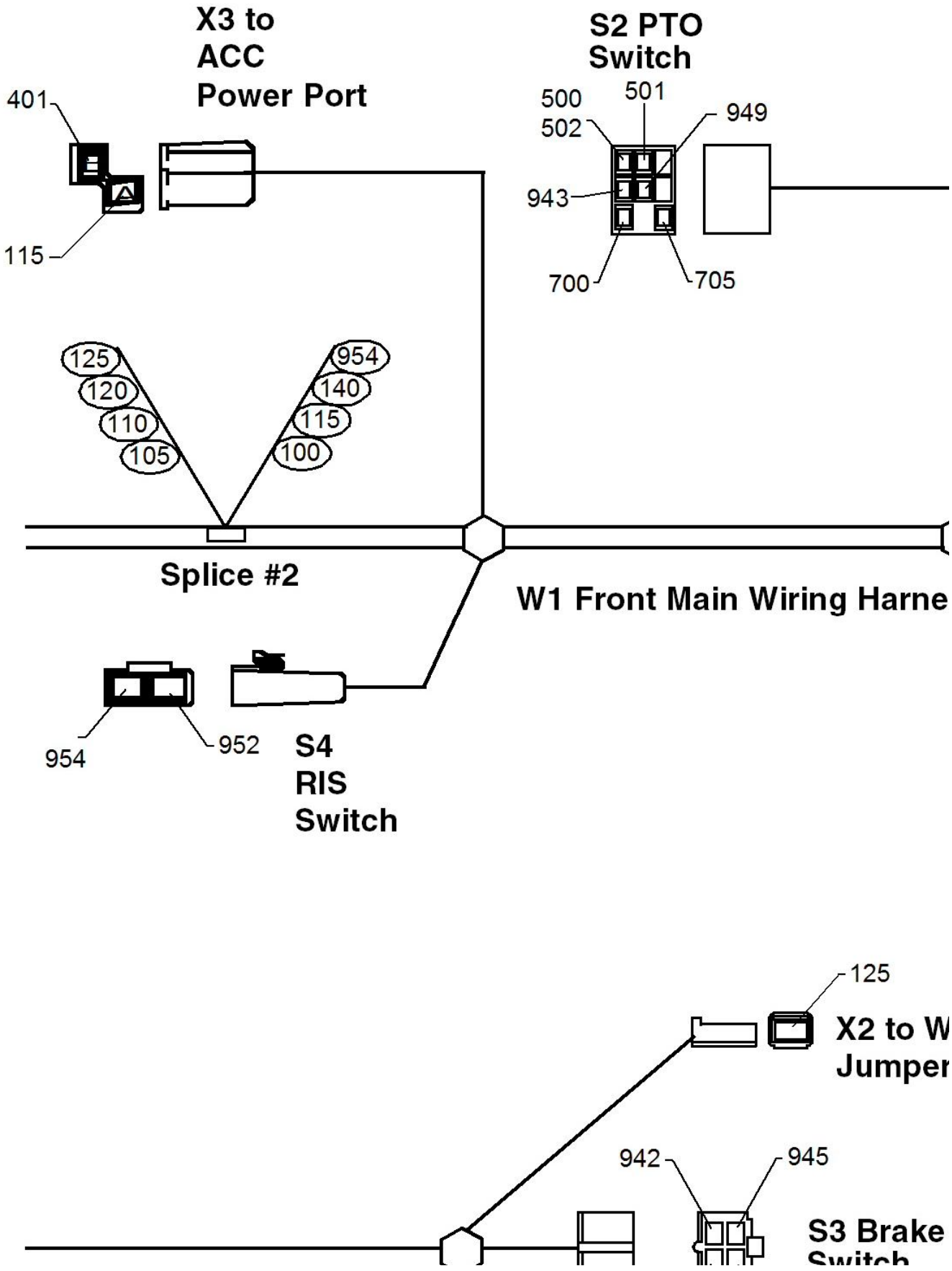

451
Yel
/Wht
200
Red
941
Wht
405 Yel
L
B
M
0 1
0
3 2 1 0
A2
S
A1
G
S1 Key
Switch
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
401
Yel
100
Blk
960
Yel/
Wht
700
Pur
500
Yel
140
Blk
P1
Hour M
405
502
Yel
220
Red
/Blk
200
Red
F1
Fuse
20A
401 Yel
201
Red

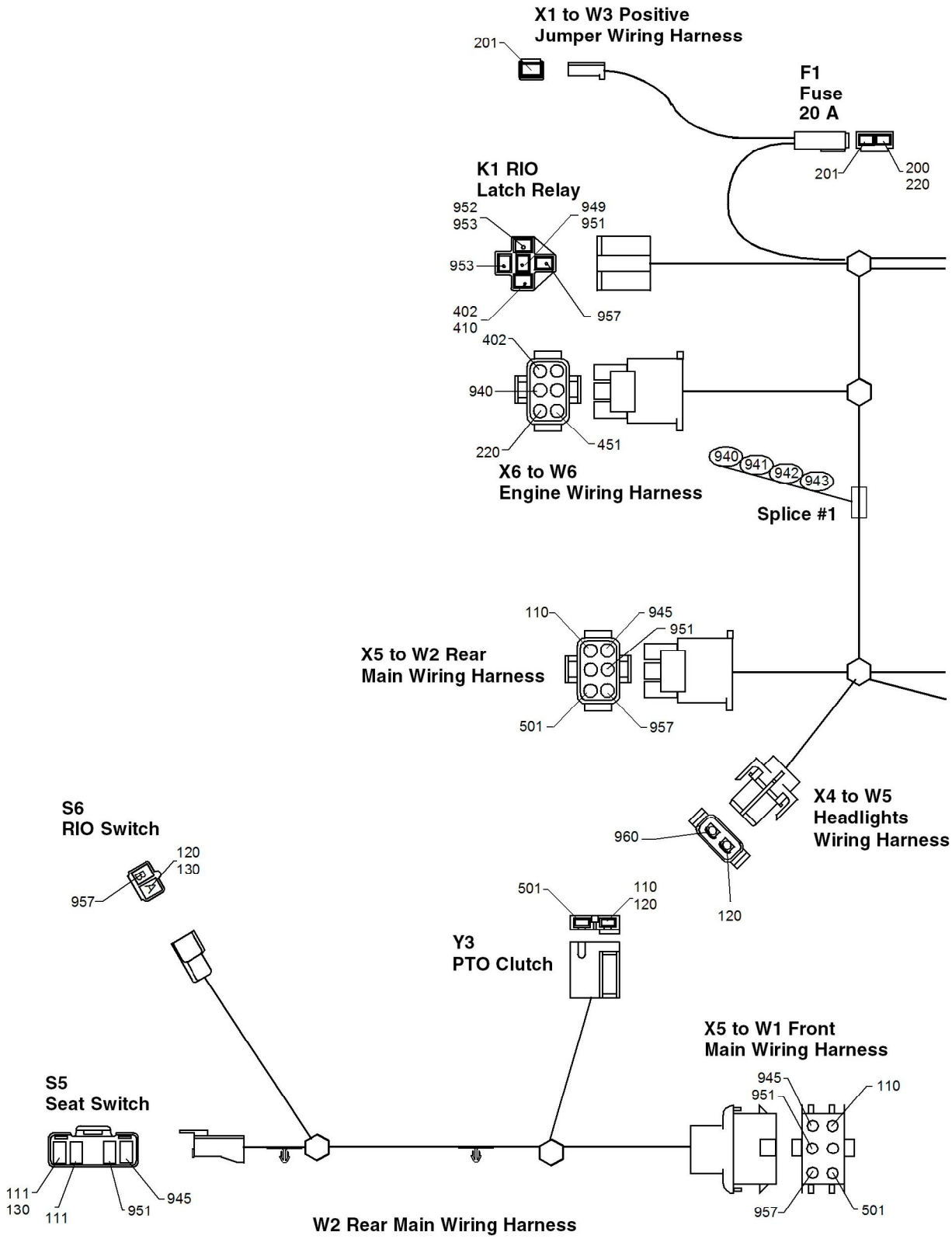

220 Red/Blk
451 Yel/Wht
940 Wht
220 Red/Blk
451 Yel/Wht
940 Wht
402 Yel
949 Wht/Blk
S4 RIS
Switch
Released
Pushed
954 Wht
952 Wht/Blk
953
Blk/Wht
949
Wht
/Blk
951 Blk/Wht
K1 RIO
Latch
Relay
402 Yel
957 Wht
501 Yel
410
Yel
410 Yel
501
Yel

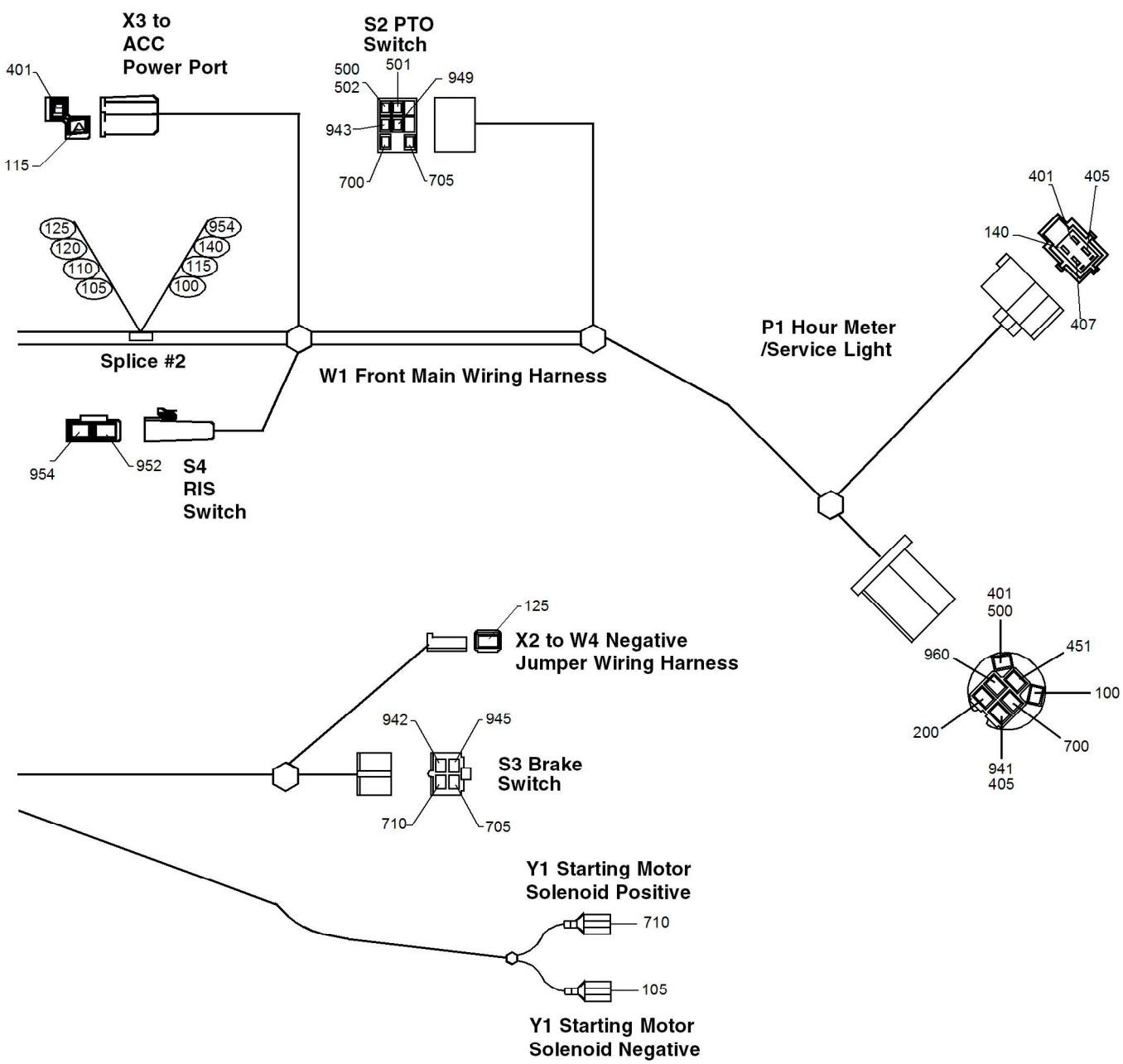

220 Red/Blk
451 Yel/Wht
941 Wht
940 Wht
940 Wht
Splice #1
451 Yel /Wht
200 Red
941 Wht
405 Yel
943 Wht
942 Wht
L
B
M
A2
S
A1
G
0 1
0
3 2 1 0
S1 Key Switch
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
401 Yel
100 Blk
960 Yel/ Wht
700 Pur
500 Yel
949 Wht/Blk
954 Wht
140 Blk
P1 Hour Meter
410 Yel
405 Yel
502 Yel
S2 PTO Switch
On
Off
220 Red /Blk
200 Red
500 Yel
502 Yel
501 Yel
943 Wht
949 Wht/Blk
700 Pur
705 Pur/Wht
F1 Fuse 20A
401 Yel
410 Yel
201 Red
S3 Brake Switch
(Off)
(On)
W3 Positive Jumper Wiring Harness
X1
710 Pur
705 Pur/Wht
942 Wht
945 Wht/Blk
Red
Red
710 Pur
X3 12VDC Power Port (Not Used on LA145, 155)
115 Blk
960 Yel /Wht
Y1 Starting Motor Solenoid
X4
Yel
E1 and E2 Headlights
Red
105 Blk
Blk
G1 Battery
M
M1 Starting Motor
X4
W5 Headlight Wiring Harness
105 Blk
120 Blk
W4 Negative Jumper Wiring Harness
115 Blk
140 Blk
100 Blk
954 Wht
110 Blk
Splice #2
X2
Blk
125 Blk
110 Blk
W1 Shielded Ground
Unswitched Power
Ground
Switched Power
SE 1 - Starting
SE - 2 Headlights

W1 and W2 Wiring Harness LA145/155/165/175


20
K
La
952
953
953
402
410
940
22
X5 to W2 Rear
Main Wiring Ha


X3 to
ACC
Power Port
401
115
S2 PTO
Switch
500
501
502
949
943
700
705
125
120
110
105
954
140
115
100
Splice #2
W1 Front Main Wiring Harne
954
952
S4
RIS
Switch
125
X2 to W
Jumper
942
945
S3 Brake
Switch


X1 to W3 Positive
Jumper Wiring Harness
201
F1
Fuse
20 A
201
200
220
K1 RIO
Latch Relay
952
953
949
951
953
957
402
410
402
940
220
451
X6 to W6
Engine Wiring Harness
940
941
942
943
Splice #1
110
945
951
X5 to W2 Rear
Main Wiring Harness
501
957
X4 to W5
Headlights
Wiring Harness
960
120
S6
RIO Switch
120
130
957
501
110
120
Y3
PTO Clutch
X5 to W1 Front
Main Wiring Harness
945
951
110
957
501
S5
Seat Switch
111
130
111
951
945
W2 Rear Main Wiring Harness


X3 to
ACC
Power Port
401
115
S2 PTO
Switch
500
501
502
949
943
700
705
125
120
110
105
954
140
115
100
Splice #2
W1 Front Main Wiring Harness
954
952
S4
RIS
Switch
401
405
140
407
P1 Hour Meter
/Service Light
401
500
960
451
100
200
700
941
405
125
X2 to W4 Negative
Jumper Wiring Harness
942
945
S3 Brake
Switch
710
705
Y1 Starting Motor
Solenoid Positive
710
105
Y1 Starting Motor
Solenoid Negative

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
W1 Front Main Wire Harness Color Codes - LA145/155/165/175

W1 Front Main Wire Harness Color Codes - LA145/155/165/175

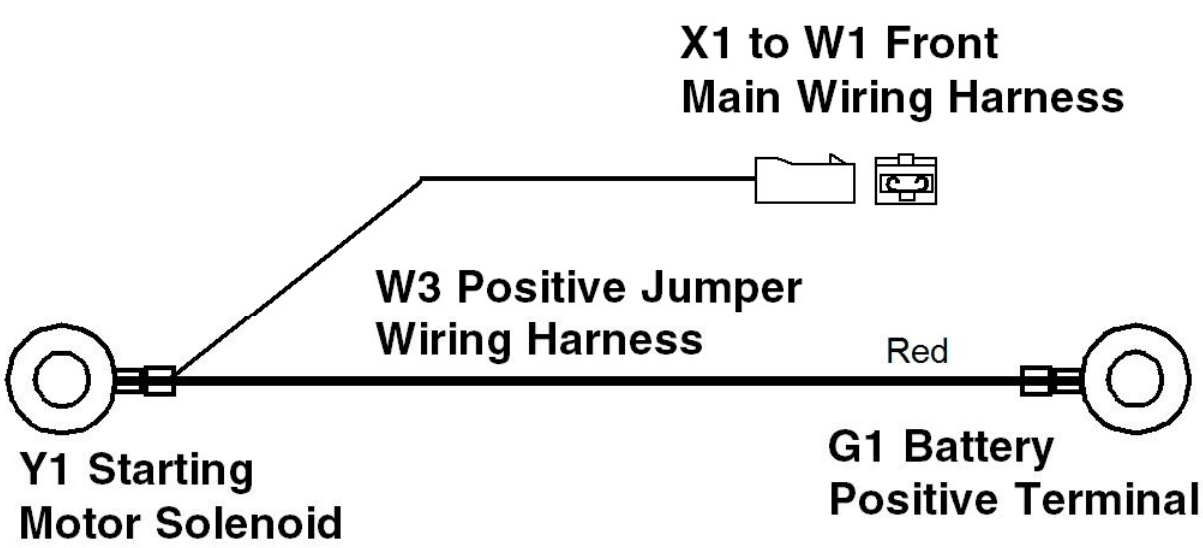
Size/No./Color	Wire Connection Points
0.5 100 Blk	S1, Splice #2
0.5 105 Blk	Y1, Splice #2
0.8 110 Blk	Splice #2, X5
0.8 115 Blk	Splice #2, X3 (Not used on LA145)
0.5 120 Blk	Splice #2, X4
1.0 125 Blk	Splice #2, X2
0.5 140 Blk	P1, Splice# 2
1.0 200 Red	F1, S1
1.0 201 Red	X1, F1
1.0 220 Red/Blk	F1, X6
0.8 401 Yel	S1, X3 (Not used on LA145)
0.5 402 Yel	K1, X6
0.5 405 Yel	S1, P1
0.8 410 Yel	P1, K1
0.5 451 Yel/Wht	S1, X6
0.8 500 Yel	S1, S2
0.8 501 Yel	S2, X5
0.8 502 Yel	P1, S2
0.5 700 Pur	S1, S2
0.5 705 Pur/Wht	S2, S3
0.5 710 Pur	S3, Y1
0.5 940 Wht	Splice #1, X6
0.5 941 Wht	Splice #1, S1
0.5 942 Wht	Splice #1, S3
0.5 943 Wht	Splice #1, S2
0.5 945 Wht/Blk	S3, X5
0.5 949 Wht/Blk	K1, S2
0.5 951 Blk/Wht	K1, X5
0.5 952 Wht/Blk	K1, S4
0.5 953 Blk/Wht	K1, K1
0.5 954 Wht	Splice #2, S4
0.5 957 Wht	K1, X5
0.5 960 Yel/Wht	S1, X4

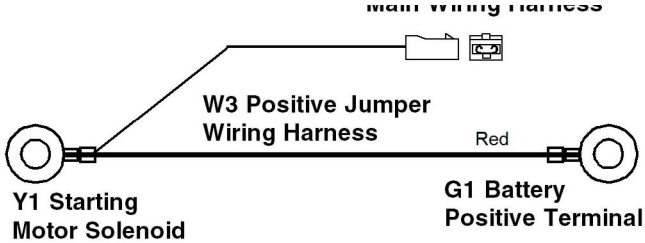
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
W2 Rear Main Wire Harness Color Codes - LA145/155/165/175

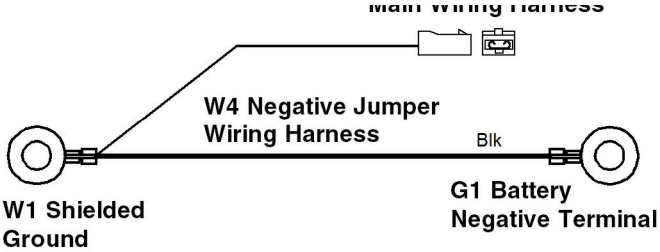
W2 Rear Main Wire Harness Color Codes - LA145/155/165/175

Size/No./Color	Wire Connection Points
0.5 110 Blk	X5, Y3
0.5 111 Blk	S5, S5
0.8 120 Blk	S6, Y3
0.5 130 Blk	S5, S6
0.8 501 Yel	X5, Y3
0.5 945 Wht/Blk	X5, S5
0.5 951 Blk/Wht	S5, X5
0.5 957 Wht	S6, X5

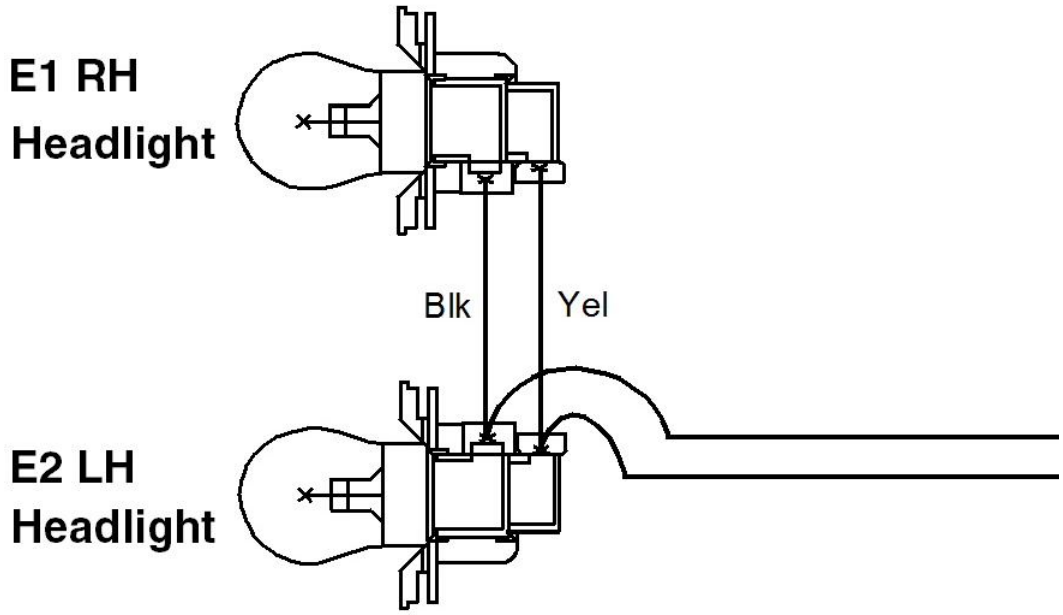
W3 and W4 Jumper Wiring Harnesses - All Models

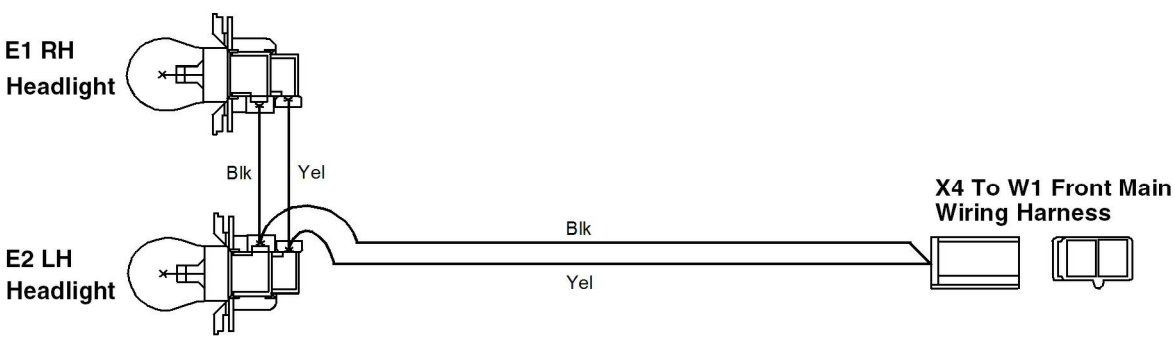



W3 Positive Jumper
Wiring Harness
Red
Y1 Starting
Motor Solenoid
G1 Battery
Positive Terminal

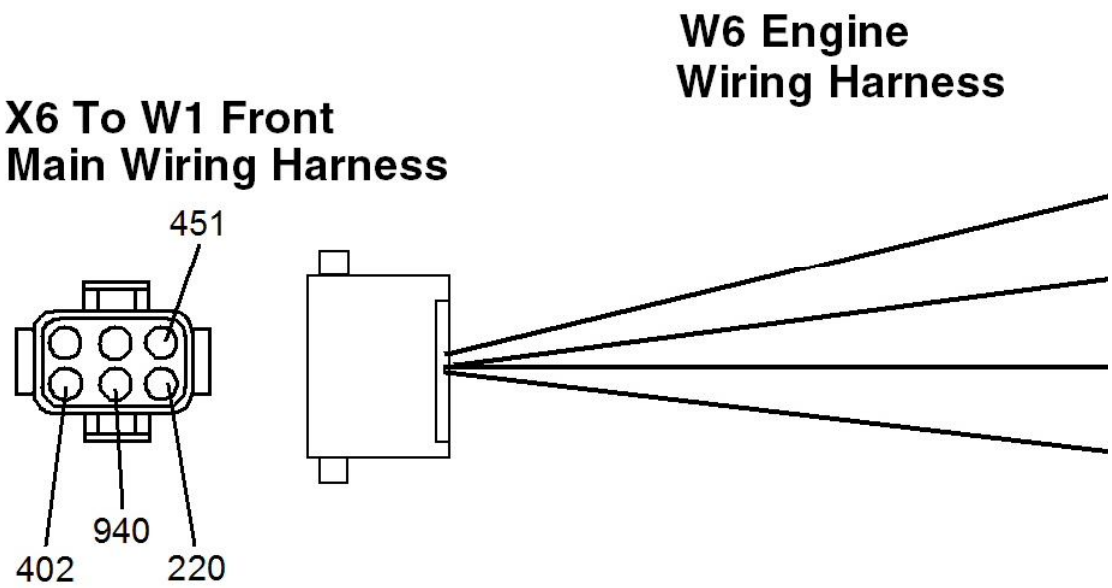

W4 Negative Jumper
Wiring Harness
Blk
W1 Shielded
Ground
G1 Battery
Negative Terminal

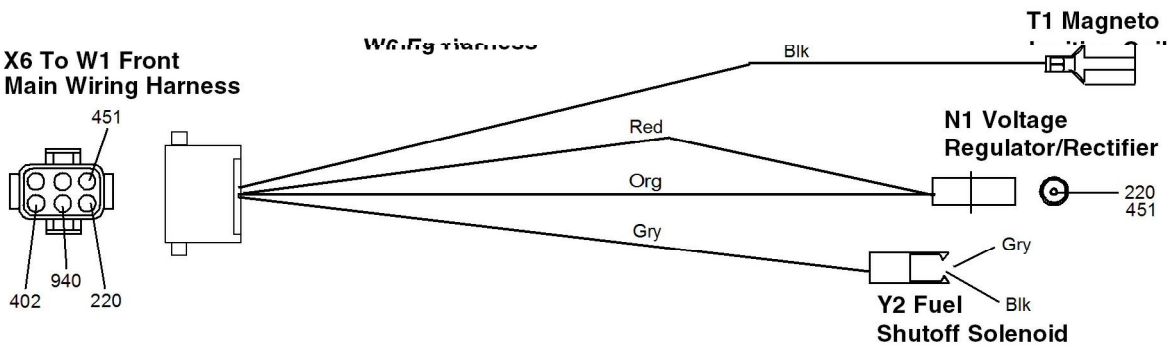
W5 Headlight Wiring Harness - All Models



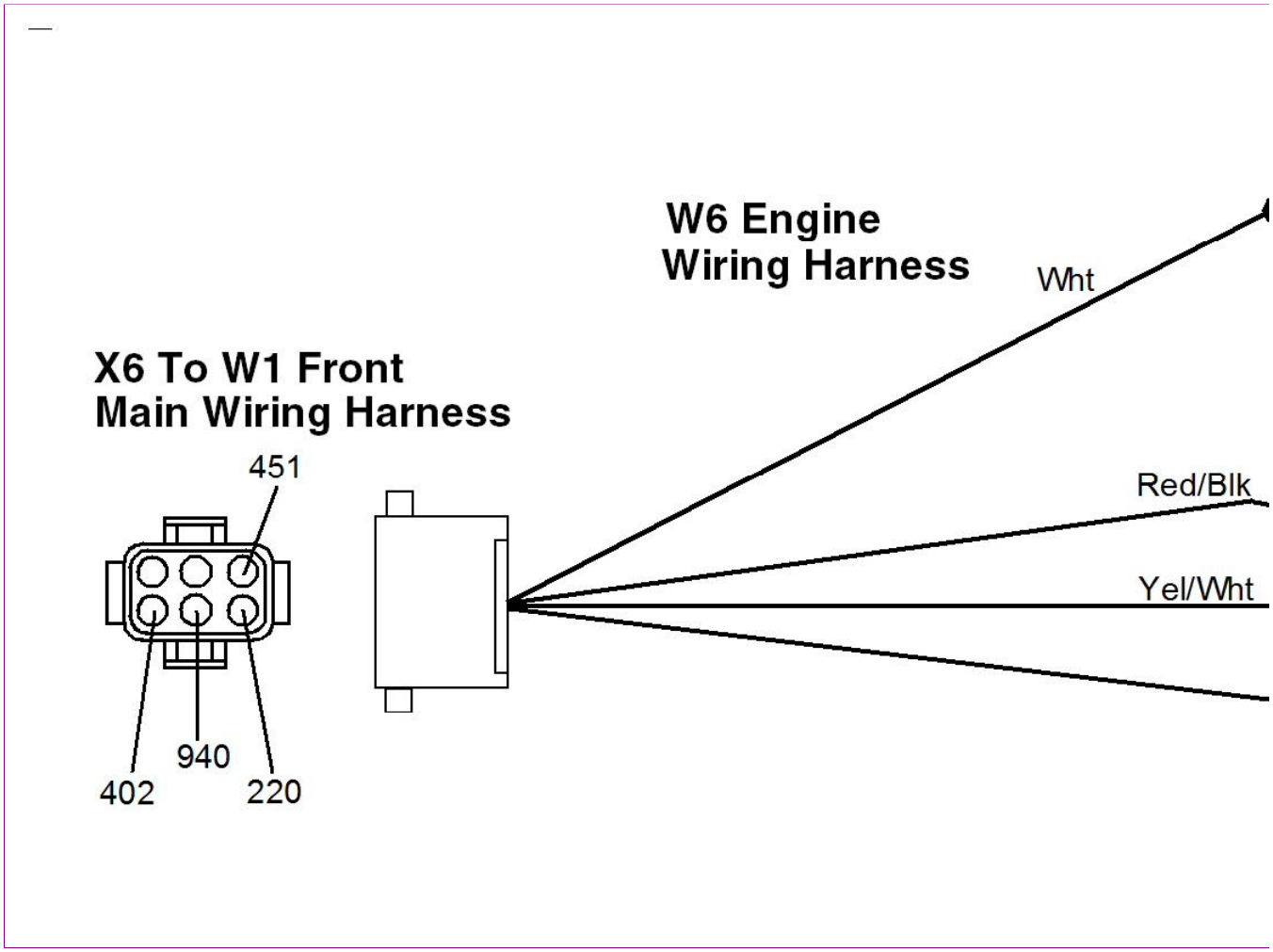

E1 RH
Headlight
Blk
Yel
E2 LH
Headlight
Blk
Yel
X4 To W1 Front Main
Wiring Harness

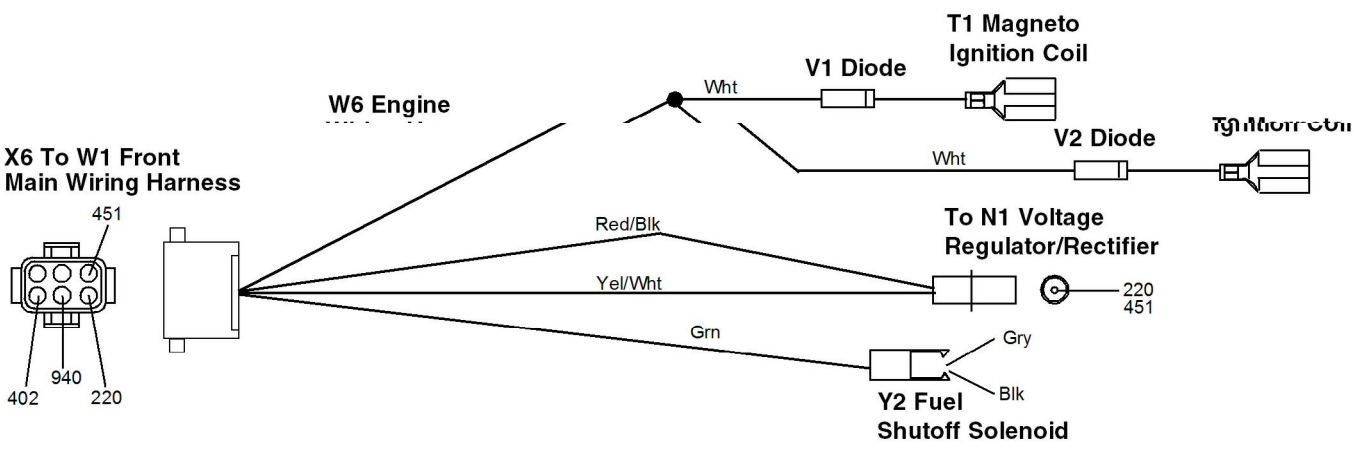
W6 Engine Wiring Harness - LA105/115/125/



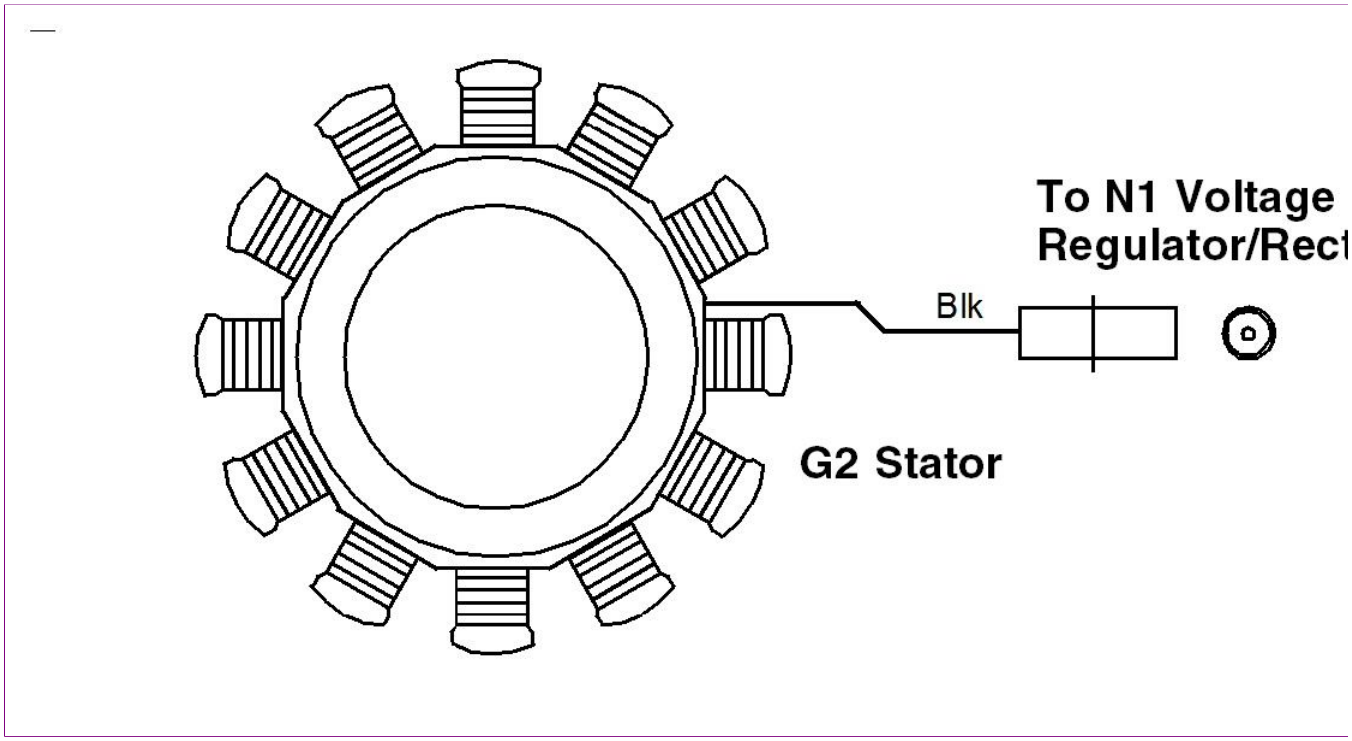

T1 Magneto
X6 To W1 Front
Main Wiring Harness
451
940
402
220
Blk
Red
Org
Gry
N1 Voltage
Regulator/Rectifier
220
451
Gry
Blk
Y2 Fuel
Shutoff Solenoid

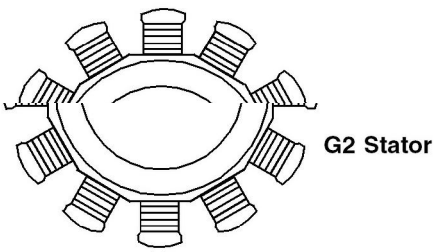
W6 Engine Wiring Harness - LA135/145/155/165/175




T1 Magneto
Ignition Coil
V1 Diode
Wht
W6 Engine
V2 Diode
Wht
X6 To W1 Front
Main Wiring Harness
451
Red/Blk
To N1 Voltage
Regulator/Rectifier
Yel/Wht
220
451
Grn
Gry
Blk
940
402
220
Y2 Fuel
Shutoff Solenoid

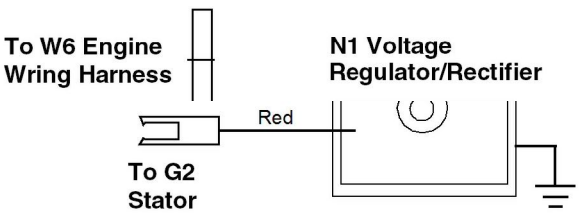
Stator and Voltage Regulator/Rectifier - LA105/115



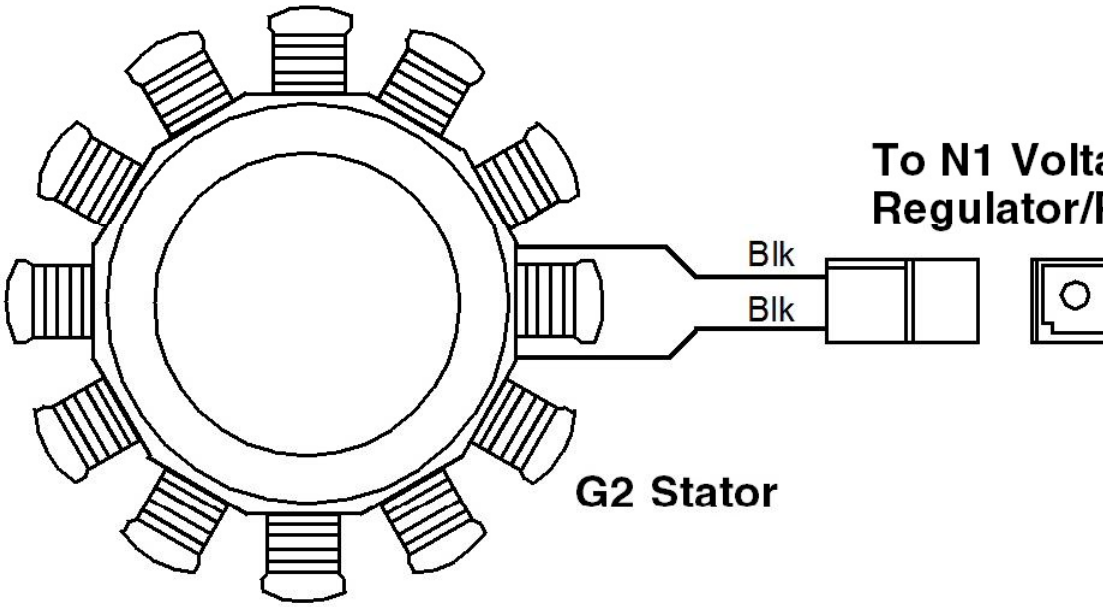


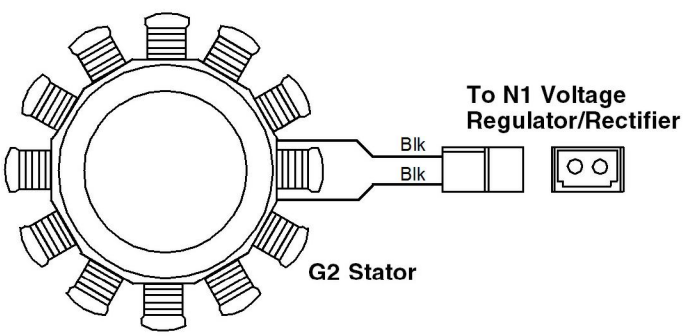
G2 Stator

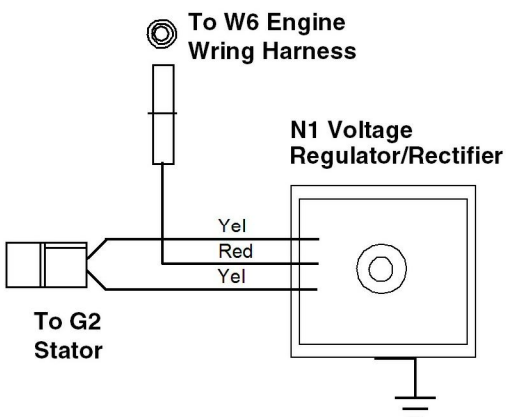
To N1 Voltage



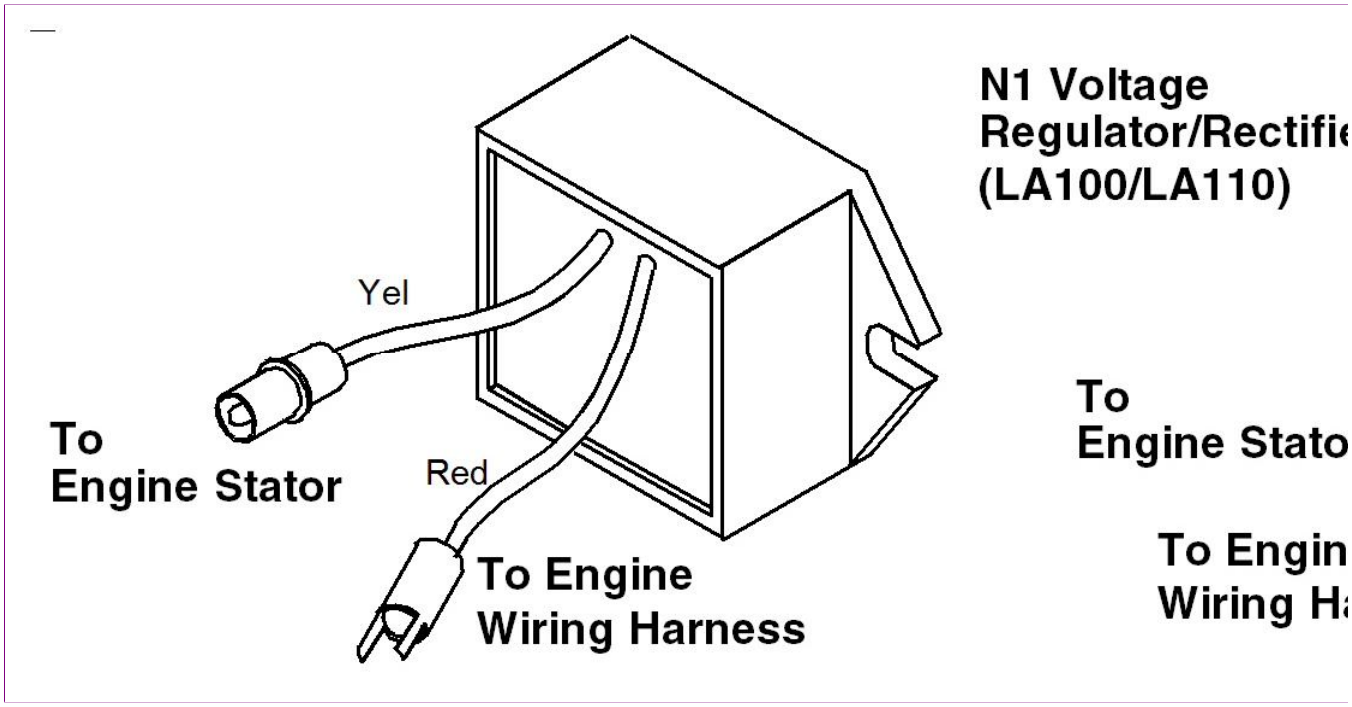
Stator and Voltage Regulator/Rectifier - LA145/155/165/175

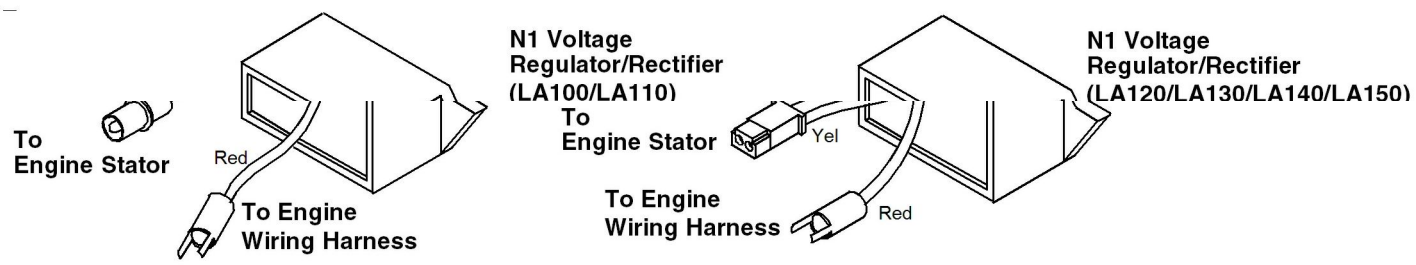



To N1 Voltage
Regulator/Rectifier
Blk
Blk
G2 Stator


To W6 Engine
Wring Harness
N1 Voltage
Regulator/Rectifier
Yel
Red
Yel
To G2
Stator

N1 Voltage Regulator/Rectifier

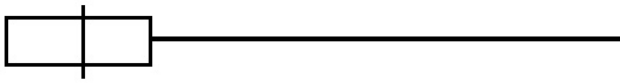



To
Engine Stator
Red
To Engine
Wiring Harness
N1 Voltage
Regulator/Rectifier
(LA100/LA110)
To
Engine Stator
Yel
To Engine
Wiring Harness
Red
N1 Voltage
Regulator/Rectifier
(LA120/LA130/LA140/LA150)

Y2 Fuel Shutoff Solenoid

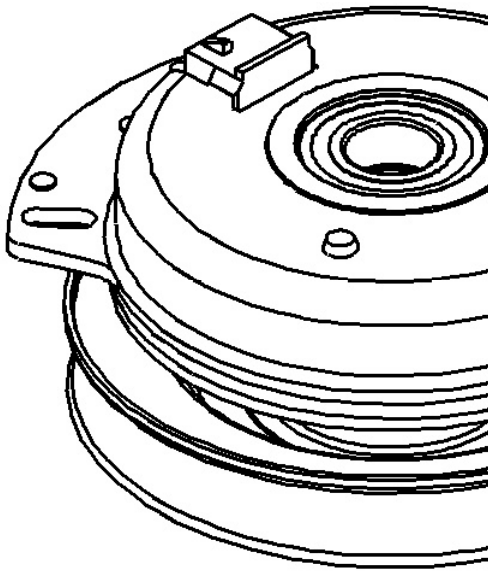
—

W6 Engine Wiring Harness



Y3 PTO Clutch - LA145/155/165/175

—



tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Power Circuit Operation - LA105/115/125/135

Power Circuit Operation - LA105/115/125/135

Function:

Provides unswitched power to primary components and switched power to secondary components whenever the battery is connected.

Operating Conditions, Unswitched Circuits:

Voltage must be present at the following components with the key switch in the off position:

- G1 battery positive terminal.
- Y1 starting motor solenoid positive contact stud.
- S1 key switch “B” and “L” terminals.
- Red wire at voltage regulator/rectifier connector.

The positive battery cable connects the battery to the starting motor solenoid bolt.

The ground cable connection is as important as the positive cable. Proper starting operation depends on these cables and connections to carry the high current for its operation.

The 201 Red wire, F1 fuse, and 200 Red wire provide unswitched voltage to the key switch “B” terminal.

The F1 fuse and 220 Red/Blk wire provide unswitched voltage to the voltage regulator/rectifier.

Operating Conditions, Switched Circuits:

Voltage must be present at the following components with the key switch in the on position:

- P1 hour meter input power (output power only when engine is running).
- K1 RIO latch relay.
- Y2 fuel shutoff solenoid.
- E1 and E2 headlights (if the key switch is in the ‘run with lights on’ position).

Placing the key switch in the run position provides voltage from 200 Red wire through the key switch to the 401, 402, and 407 Yel wires (not used on LA105/LA115 models), P1 hour meter, K1 RIO latch relay, and the Y2 fuel shutoff solenoid.

The 401 Yel wire provides power to the P1 hour meter. The 407 Yel wire provides power to the K1 RIO latch relay (via the hour meter). The K1 relay will not energize until a ground is provided to the coil. The 402 Yel wire provides power to the Y2 fuel shutoff solenoid coil.

The P1 hour meter is powered by the 401 Yel wire and grounded through the 140 Blk wire. This only turns the hour meter on; it does not cause the meter to increment time.

The P1 hour meter is powered by pulses from the ignition coil(s) sent to the S1 key switch where a splice with the 405 Yel wire is located. The 405 Yel wire sends these pulses to the P1 hour meter which in turn provides power for the meter. This assures that the hour meter only increments when the engine is running.

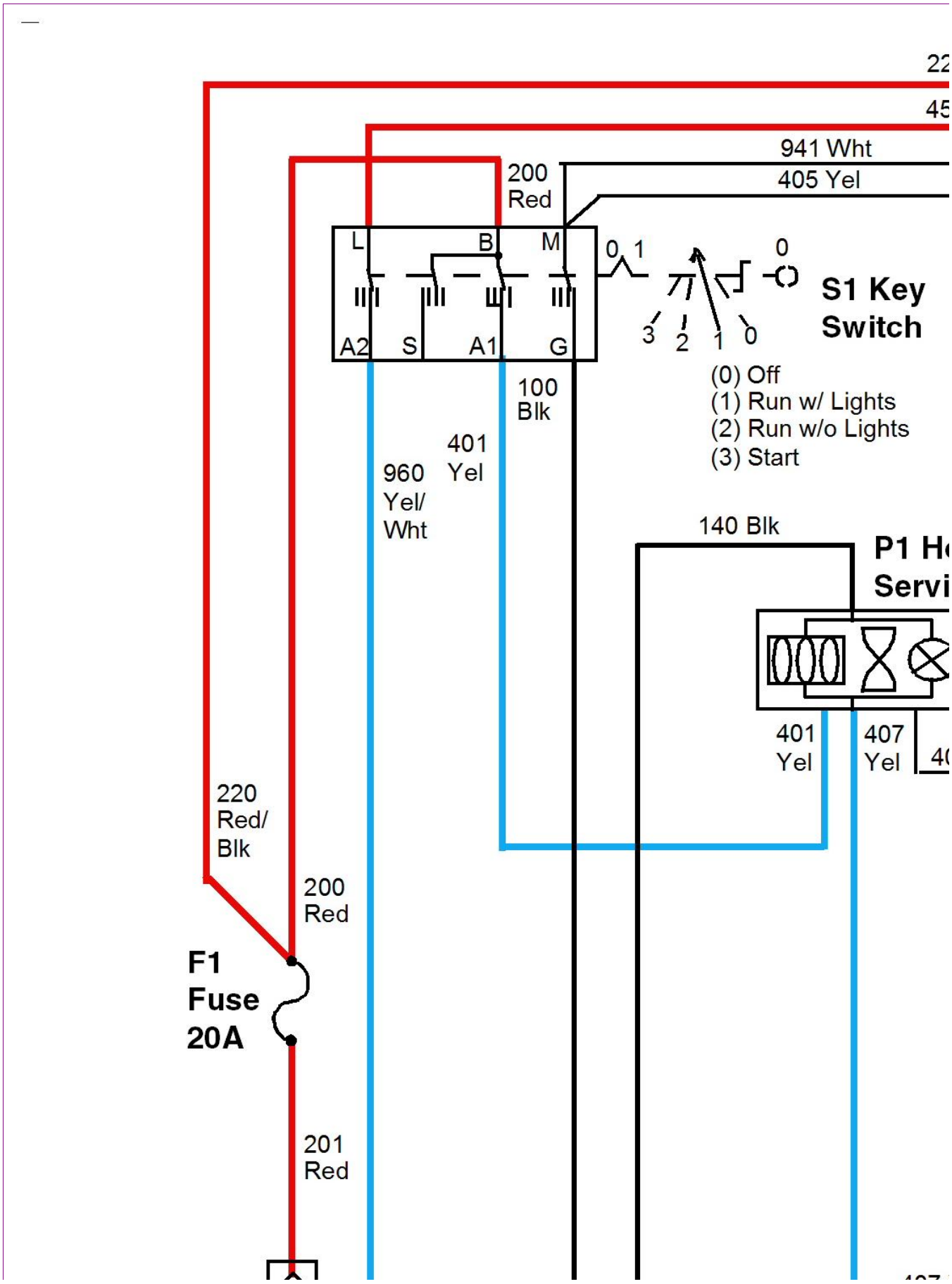
If the key switch is placed in the ‘run with lights on’ position, the 960 Yel wire will provide power to X4 connector of the headlight wiring harness.

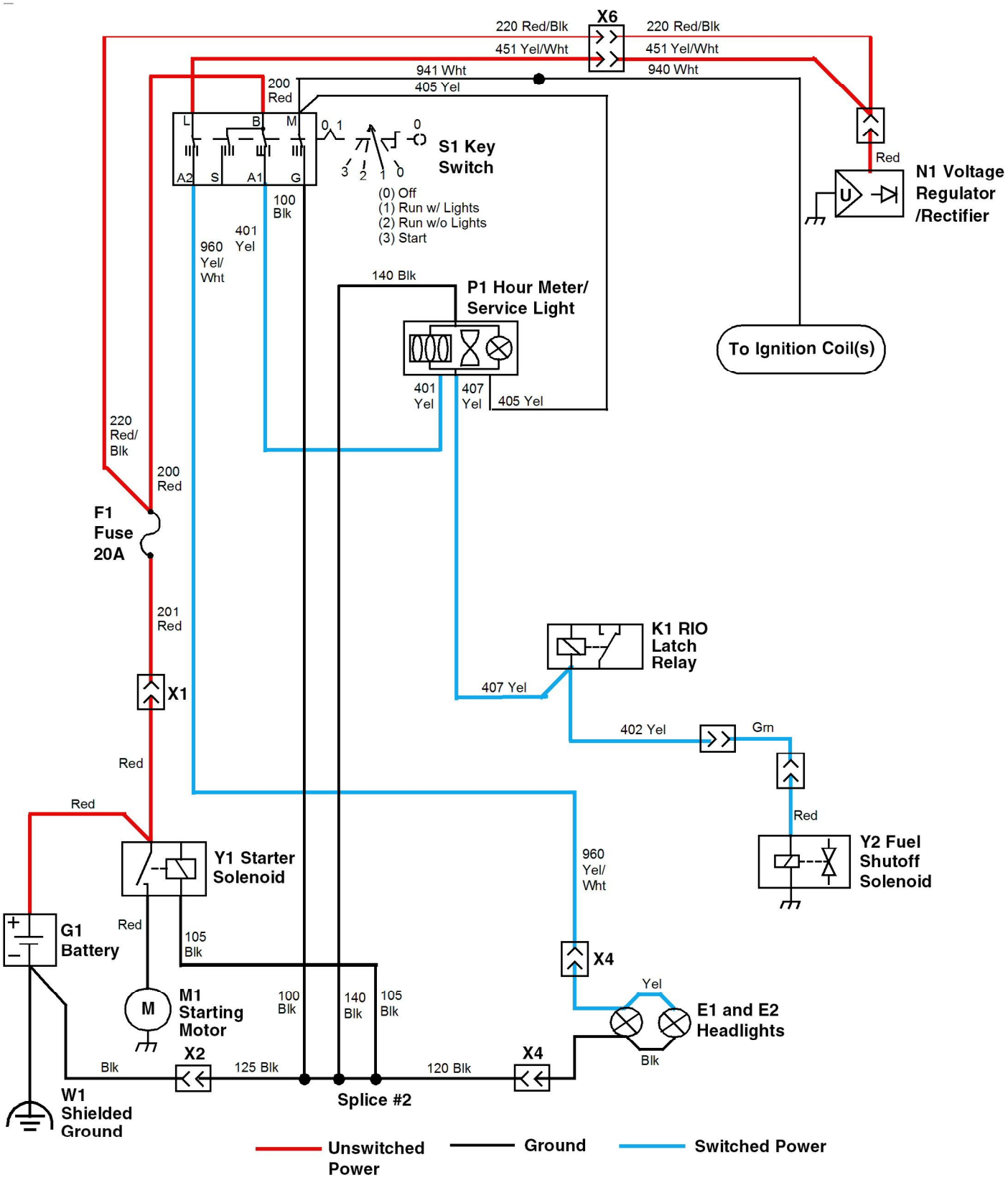
Ground Circuits for Switched Circuits:

- P1 hour meter: 140 Blk wire, splice to 125 Blk wire, to W4 negative engine wiring harness, and finally completed by the negative battery cable.
- Y1 starting motor solenoid, 105 Blk wire, splice to 125 Blk wire, to W4 negative engine wiring harness, and finally completed by the negative battery cable.
- K1 RIO latch relay: A path to ground is only present if the RIS switch is pressed (954 Wht wire). See PTO with RIO Circuit Operation - LA105/115/125/135 .
- Y2 fuel shutoff solenoid: The solenoid is grounded by a Blk wire attached to the engine.
- E1 and E2 headlights: W5 headlight wiring harness Blk wire, via connector X4, to 120 Blk wire, spliced to 125 Blk wire, to W4 negative wiring harness, and completed by the negative battery cable.

2007091912018-19-200610110954

Power Circuit Electrical Schematic - LA105/115/125/135


941 Wht
405 Yel
200
Red
L
B
M
0 1
0
A2
S
A1
G
3 2 1 0
S1 Key
Switch
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
100
Blk
401
Yel
960
Yel/
Wht
140 Blk
401
Yel
407
Yel
220
Red/
Blk
200
Red
F1
Fuse
20A
201
Red


X6
220 Red/Blk
220 Red/Blk
451 Yel/Wht
451 Yel/Wht
941 Wht
940 Wht
405 Yel
200
Red
L
B
M
A2
S
A1
G
0 1
0
3 2 1 0
S1 Key
Switch
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
100
Blk
401
Yel
960
Yel/
Wht
Red
N1 Voltage
Regulator
/Rectifier
U
140 Blk
P1 Hour Meter/
Service Light
To Ignition Coil(s)
401
Yel
407
Yel
405 Yel
220
Red/
Blk
200
Red
F1
Fuse
20A
201
Red
X1
K1 RIO
Latch
Relay
407 Yel
402 Yel
Grn
Red
Red
Red
Y1 Starter
Solenoid
960
Yel/
Wht
Y2 Fuel
Shutoff
Solenoid
G1
Battery
Red
105
Blk
X4
Yel
M
M1
Starting
Motor
100
Blk
140
Blk
105
Blk
E1 and E2
Headlights
Blk
X2
X4
Blk
125 Blk
120 Blk
W1
Shielded
Ground
Splice #2
Unswitched
Power
Ground
Switched Power

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Power Circuit Diagnosis - LA105/115/125/135

Power Circuit Diagnosis - LA105/115/125/135

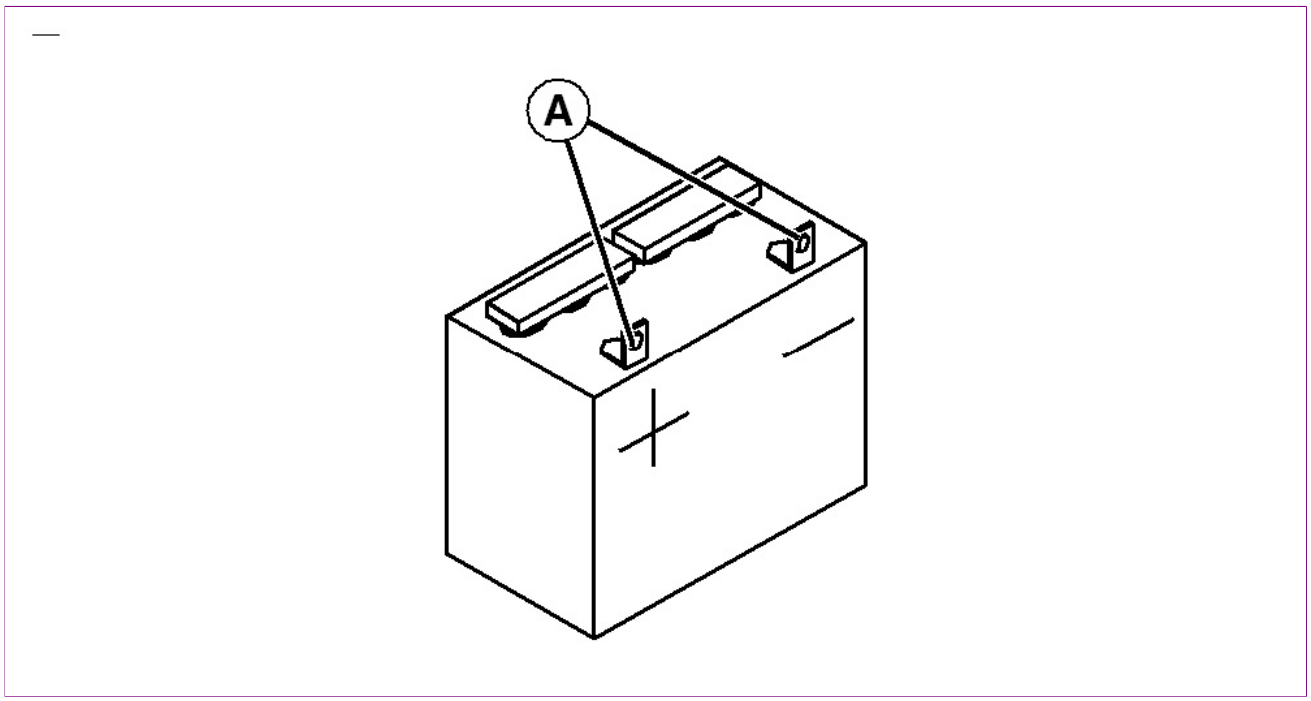
Test Procedure A

Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake engaged.
- Battery fully charged.
- Key switch in off position.

1 Power Circuit

Action:



Is battery voltage, measured between the posts (A), 12.4 VDC or greater?

Result:

YES: Go to next step.

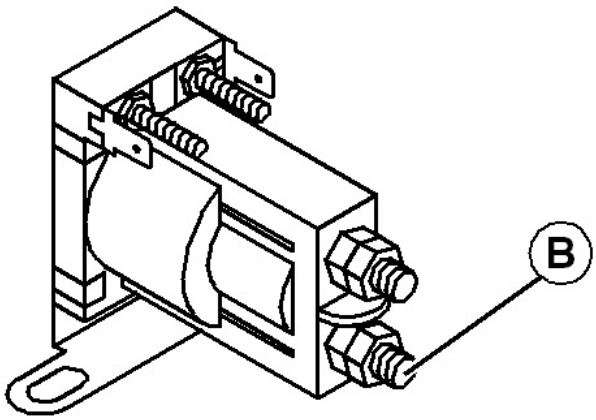
NO: Clean battery terminals and retest.

NO: Charge battery and retest.

NO: Replace battery.

Action:

—



Is battery voltage present at starting motor solenoid battery terminal (B)?

Result:

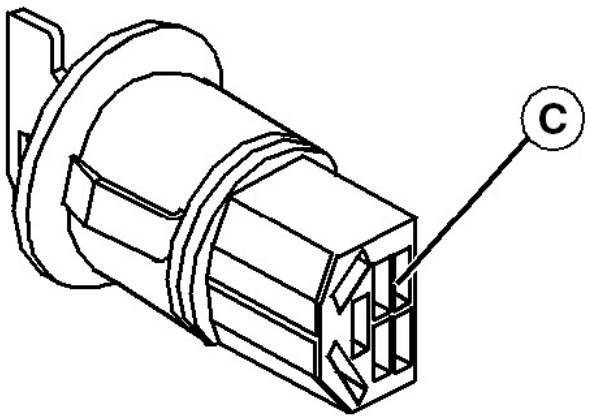
YES: Go to next step.

NO: Clean, check, and tighten connections for battery cable

NO: Replace battery cable.

Action:

—



Is battery voltage present at key switch, 200 Red wire (C)?

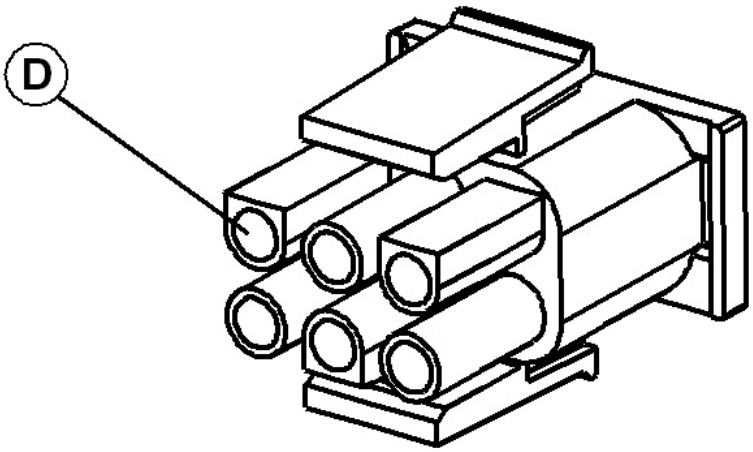
Result:

YES: Go to next step.

NO: Check 200 Red wire and connections.

Action:

—



Is battery voltage present at 220 Red/Blk wire of X6 engine connector (D)?

Result:

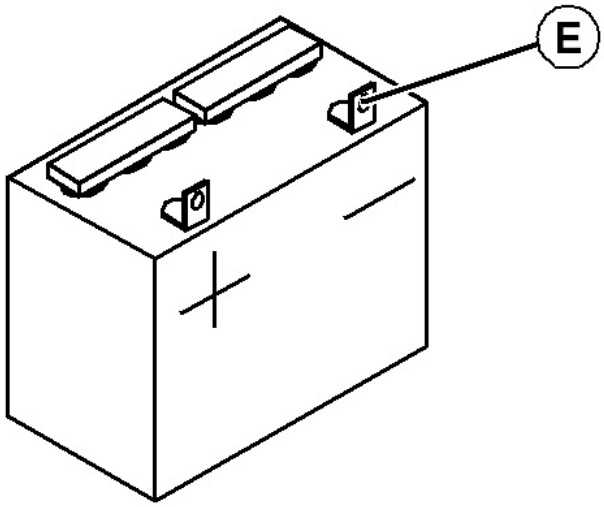
YES: Go to next step.

NO: Check 220 Red/Blk wire and connections.

NO: Check F1 fuse, 220 Red/Blk wire, and connections.

Action:

—



Is the resistance, measured between battery negative post (E) and frame ground connection, 0.1 ohm or less?

Result:

NO: Clean and check battery negative cable. Replace if necessary.

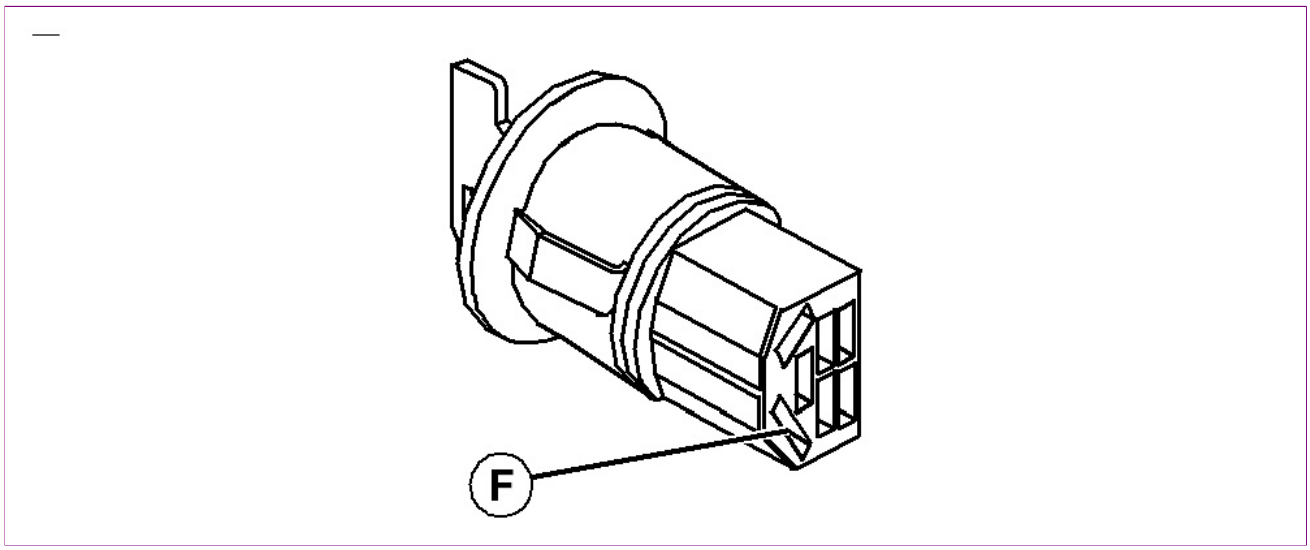
Test Procedure B

Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake locked.
- Battery fully charged.
- Key switch in run position.
- Engine off.

1 Power Circuit:

Action:



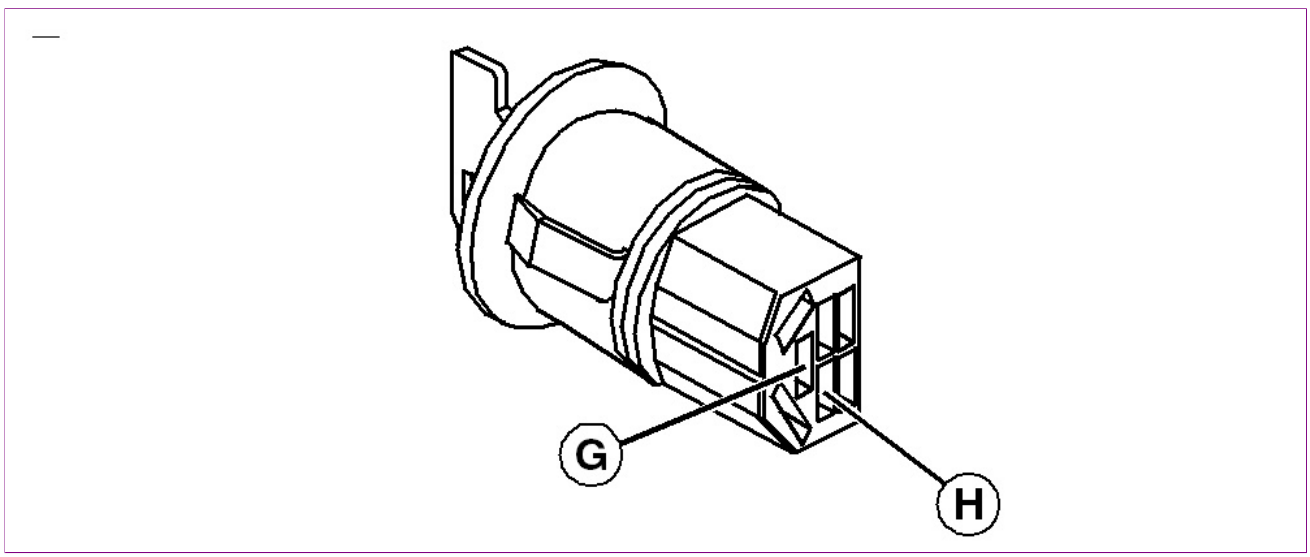
Is battery voltage present at key switch 401 Yel wire (F)?

Result:

YES: Go to next step.

NO: Test key switch and replace as necessary.

Action:



Is battery voltage at “L” terminal, 451 Yel/Wht wire of S1 Key switch (G)?

Result:

YES: Go to next step.

NO: Check 451 Yel/Wht wires and connections.

Action:

With key switch in run with lights position, is battery voltage present at “A2” terminal of S1 key switch, 960 Yel/Wht wire (H)?

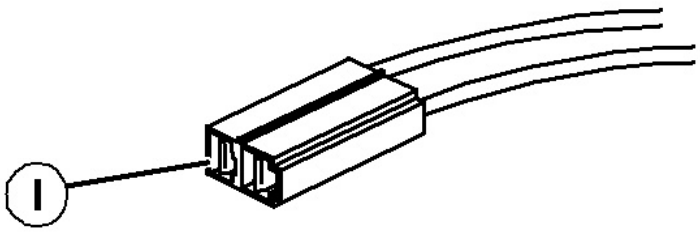
Result:

YES: Go to next step.

NO: Test key switch. See Key Switch Test .

Action:

—



With the key switch is in the “run with headlights” position - Is battery voltage present at W5 headlight wiring harness 960 Yel/Wht wire (I)?

Result:

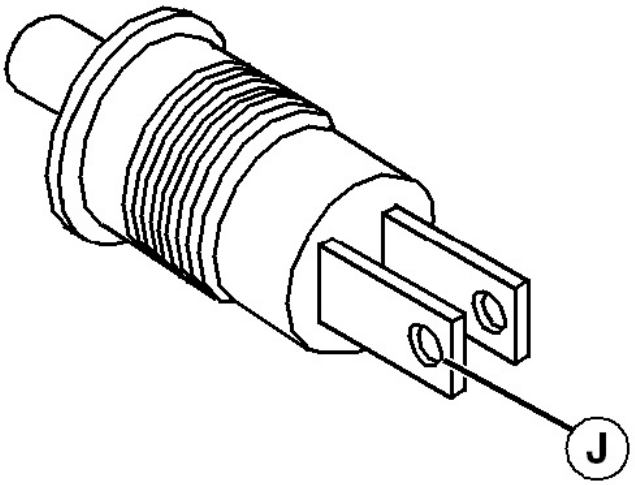
YES: If battery voltage is present and headlights do not function, test headlights. See Headlight Circuit Diagnosis - L100/L105/L107/L110/L120/L130 .

NO: Check headlight ground circuit. Test for continuity to ground at 120, 125 Blk wires, and W4 negative jumper wiring harness.

NO: Check 960 Yel/Wht wire and connections.

Action:

—



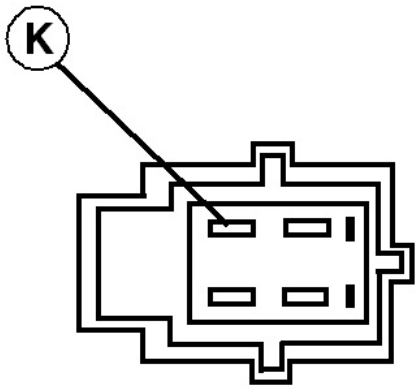
Is continuity to ground present at 954 Wht wire (J) of S4 RIS switch?

Result:

NO: Check 954 Wht and 125 Blk wires, W4 negative jumper wiring harness, and connections.

Action:

—



Is battery voltage present at P1 hour meter, 401 Yel wire (K)?

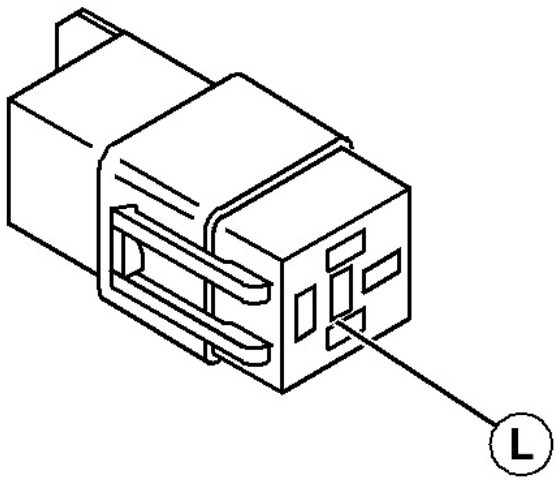
Result:

YES: Go to next step.

NO: Check 401 Yel wire and connections.

Action:

—



Is battery voltage present at K1 RIO latch relay, 407 Yel wire (L)?

Result:

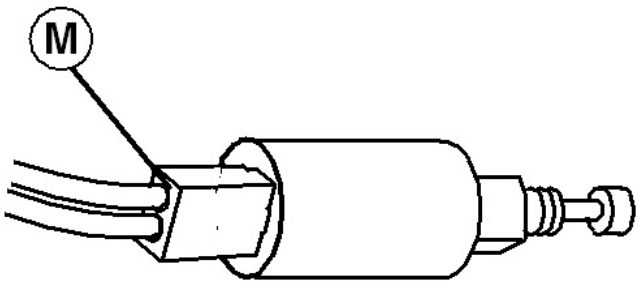
YES:

NO: Check 407 Yel wire and connections.

NO: Test P1 hour meter. See Hour Meter/Service Indicator Test .

Action:

—



Is battery voltage present at fuel shutoff solenoid Gry wire (M)?

Result:

YES: End of tests.

NO: Check 402 Yel wire and connections.

NO: If fuel shutoff solenoid does not click, test solenoid. See Fuel Shutoff Solenoid Test .

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Power Circuit Operation - LA145/155/165/175

Power Circuit Operation - LA145/155/165/175

Function:

Provides unswitched power to primary components and switched power to secondary components whenever the battery is connected.

Operating Conditions, Unswitched Circuits:

Voltage must be present at the following components with the key switch in the off position:

- G1 battery positive terminal.
- Y1 starting motor solenoid positive contact stud.
- S1 key switch “B” and “L” terminals.
- Red wire at voltage regulator/rectifier connector.

The positive battery cable connects the battery to the starting motor solenoid bolt.

The ground cable connection is as important as the positive cable. Proper starting operation depends on these cables and connections to carry the high current for it’s operation.

The 201 Red wire, F1 fuse, and 200 Red wire provide unswitched voltage to the “B” terminal of the S1 key switch. The 451 Yel wire provides battery voltage to the “L” terminal of the S1 key switch, via a splice at the N1 regulator connector.

The F1 fuse and 220 Red/Blk wire provide unswitched voltage to the voltage regulator/rectifier.

Operating Conditions, Switched Circuits:

Voltage must be present at the following components with the key switch in the on position:

- P1 hour meter input (output power only when engine is running).
- S2 PTO switch.
- X3 power port (LA165/LA175 only).
- K1 RIO latch relay (via the P1 hour meter).
- Y2 fuel shutoff solenoid.
- E1 and E2 headlights (if the key switch is in the ‘run with lights on’ position).

Placing the key switch in the run position provides voltage from 200 Red wire through the key switch to the 500, 401, 410 (via the P1 hour meter), 502, and 402 Yel wires, S2 PTO switch, X3 power port, K1 RIO latch relay (via the P1 power port), and the Y2 fuel shutoff solenoid.

The 500 Yel wire provides power to the S2 PTO switch. The 401 Yel wire provides power to the X3 power port. The 410 Yel wire, via the P1 power port, provides power to the K1 RIO latch relay. The K1 relay will not energize until a ground is provided to the relay coil. The 402 Yel wire, via a splice at K1 RIO latch relay connector, provides power to the Y2 fuel shutoff solenoid coil.

The P1 hour meter is powered by the 502 Yel wire and grounded through the 140 Blk wire. This only turns the hour meter on; it does not cause the meter to increment time.

The P1 hour meter is activated by pulses from the ignition coils sent to the S1 key switch where a splice with the 405 Yel wire is located. The 405 Yel wire sends these pulses to the P1 hour meter which in turn provides the drive signal for the meter. This assures that the hour meter only increments when the engine is running.

If the S1 key switch is in the 'run with lights on position', the 960 Yel/Wht wire (connected to the key switch "A2" terminal) provides power to the E1 and E2 headlights.

Ground Circuits for Switched Circuits:

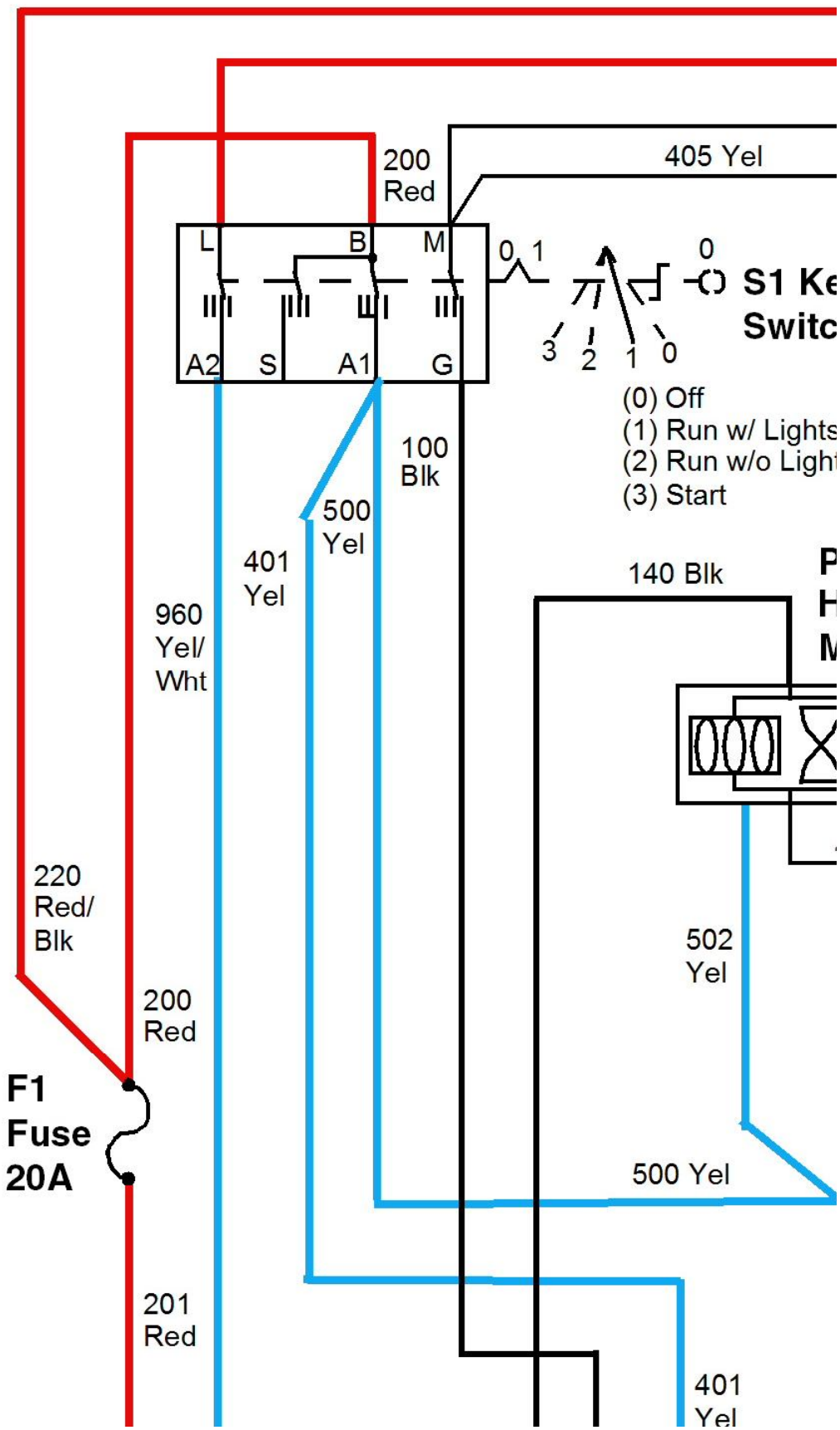
- P1 hour meter: 140 Blk, spliced to the 125 Blk wire, which plugs into the W4 negative wiring harness, and terminates at the frame ground and the negative battery terminal.
- S2 PTO switch: The path to ground is only completed if the PTO switch is placed in the on position. See PTO Clutch Circuit Operation - L120/L130 .
- *NOTE:*

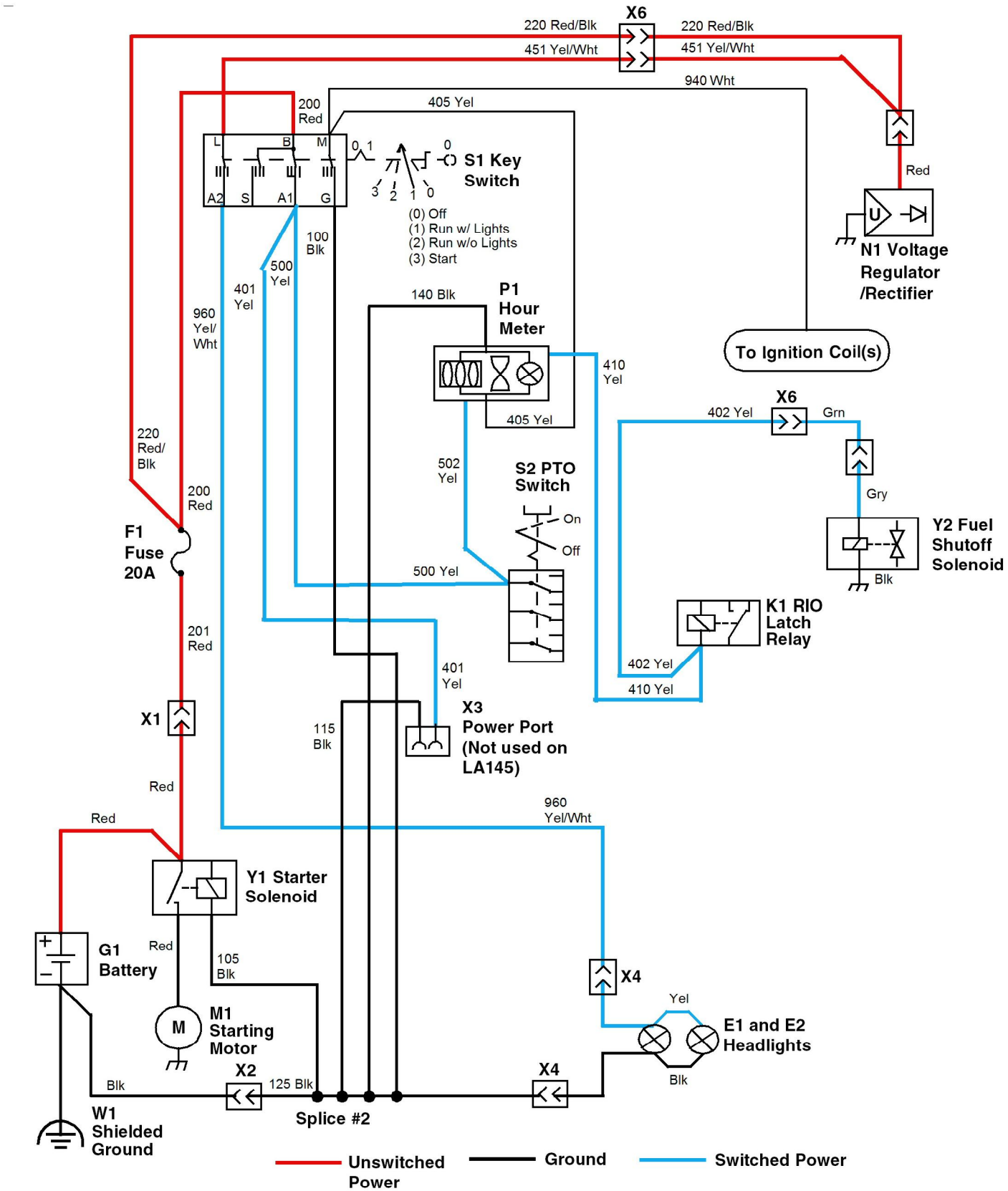
  The X3 power port circuit is only completed if a device is plugged into the power port.

  X3 power port: 115 Blk wire to 125 Blk wire splice. This connects to the W4 negative wiring harness and completes the ground path at the negative battery terminal.
- K1 RIO latch relay: The path to ground is only completed if the RIS switch is depressed. For more information, see See PTO with RIO Circuit Operation - LA145/165/175 .
- Y2 fuel shutoff solenoid: The shutoff solenoid is grounded by a Blk wire attached to the engine.
- E1 and E2 headlights: W5 headlight wiring harness Blk wire, via connector X4, to 120 Blk wire, spliced to 125 Blk wire, to W4 negative wiring harness, and completed by the negative battery cable.

20070919121412-19-200610110954

Power Circuit Electrical Schematic - LA145/155/165/175


200
Red
405 Yel
L
B
M
0 1
0
S1 Ke
Switc
A2
S
A1
G
3 2 1 0
(0) Off
(1) Run w/ Lights
(2) Run w/o Light
(3) Start
100
Blk
500
Yel
401
Yel
140 Blk
960
Yel/
Wht
220
Red/
Blk
502
Yel
200
Red
F1
Fuse
20A
500 Yel
201
Red
401
Yel


X6
220 Red/Blk
451 Yel/Wht
220 Red/Blk
451 Yel/Wht
940 Wht
200
Red
405 Yel
L
B
M
A2
S
A1
G
0 1
3 2 1 0
0
S1 Key
Switch
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
Red
U
N1 Voltage
Regulator
/Rectifier
100
Blk
500
Yel
401
Yel
960
Yel/
Wht
140 Blk
P1
Hour
Meter
To Ignition Coil(s)
410
Yel
405 Yel
X6
402 Yel
Grn
220
Red/
Blk
502
Yel
S2 PTO
Switch
On
Off
Gry
Y2 Fuel
Shutoff
Solenoid
Blk
200
Red
F1
Fuse
20A
500 Yel
K1 RIO
Latch
Relay
201
Red
401
Yel
402 Yel
410 Yel
X1
115
Blk
X3
Power Port
(Not used on
LA145)
Red
960
Yel/Wht
Red
Y1 Starter
Solenoid
G1
Battery
Red
105
Blk
X4
Yel
M
M1
Starting
Motor
E1 and E2
Headlights
X2
X4
Blk
125 Blk
Blk
Splice #2
W1
Shielded
Ground
Unswitched
Power
Ground
Switched Power

Power Circuit Diagnosis - LA145/155/165/175

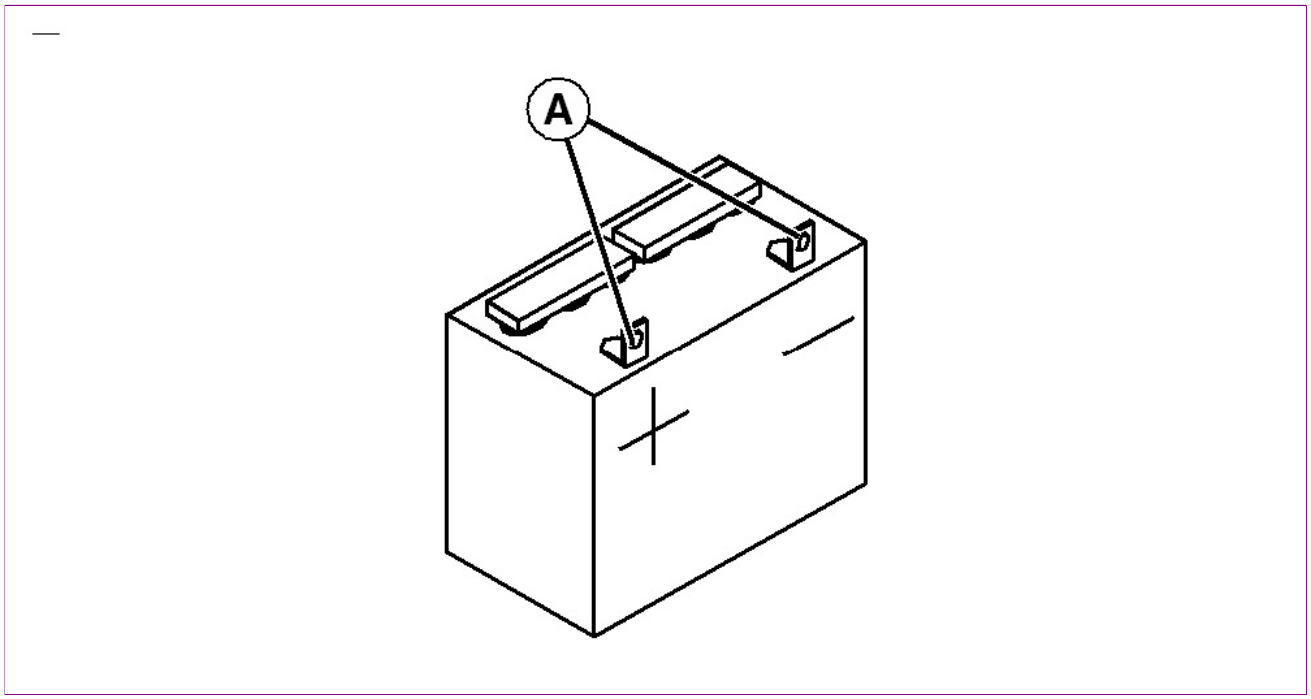
Test Procedure A

Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake engaged.
- Battery fully charged.
- Key switch in off position.
- PTO in off position.

1 Power Circuit

Action:



Is battery voltage, measured between the posts (A), 12.4 VDC or greater?

Result:

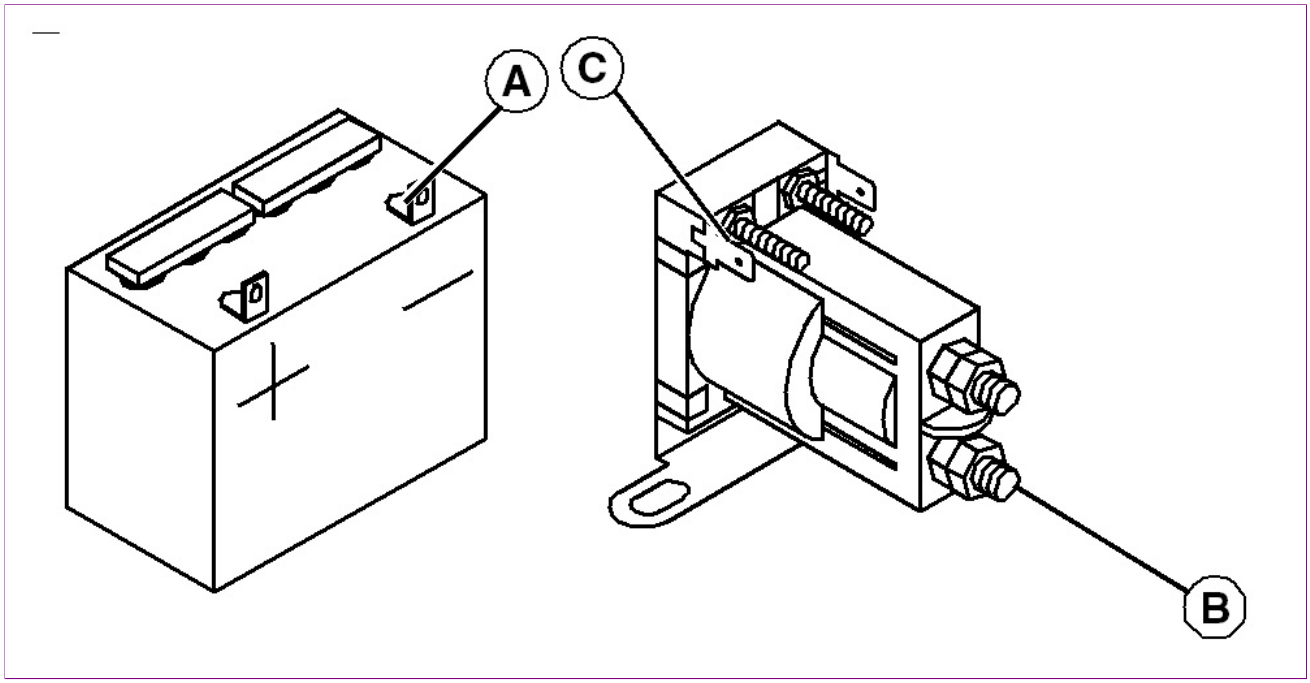
YES: Go to next step.

NO: Clean battery terminals and retest.

NO: Charge battery and retest.

NO: Replace battery.

Action:



Is battery voltage present at battery terminal of starting motor solenoid (B)?

Result:

YES: Go to next step.

NO: Clean, check, and tighten connections for battery cable

NO: Replace battery cable.

Action:

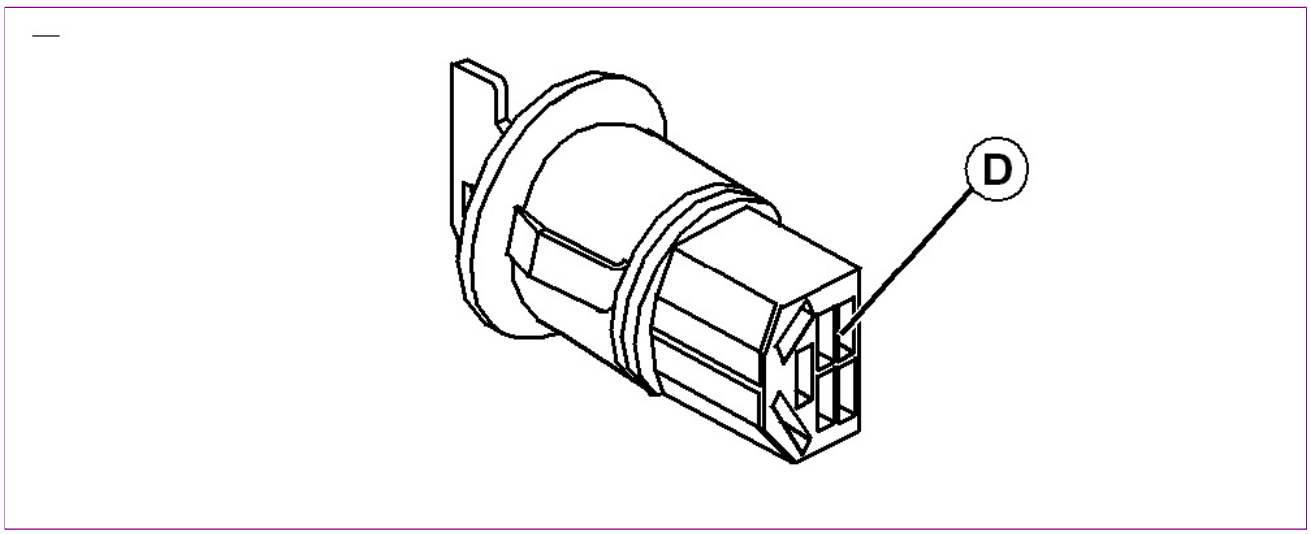
Is the resistance, measured between negative battery terminal and starter solenoid negative battery terminal 105 Blk wire (C), 0.2 ohms or less?

Result:

NO: See Test Procedure B .

NO: Check 105 and 125 Blk wires and connections.

Action:



Is battery voltage present at key switch, 200 Red wire (D)?

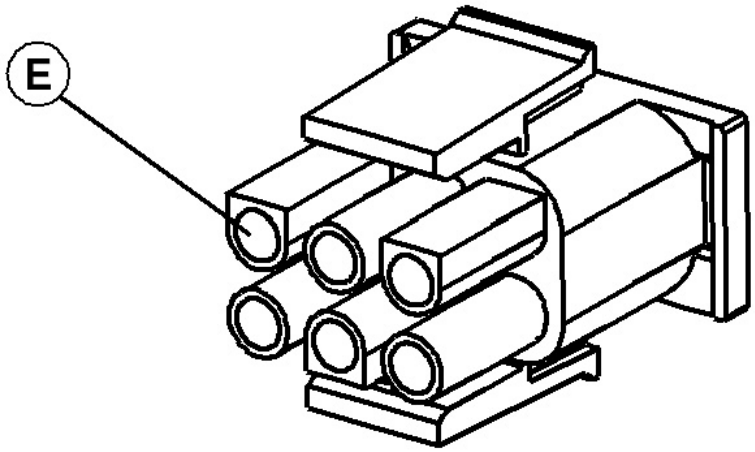
Result:

YES: Go to next step.

NO: Check 200 Red wire and connections.

Action:

—



Is battery voltage present at 220 Red/Blk wire of X6 engine connector (E)?

Result:

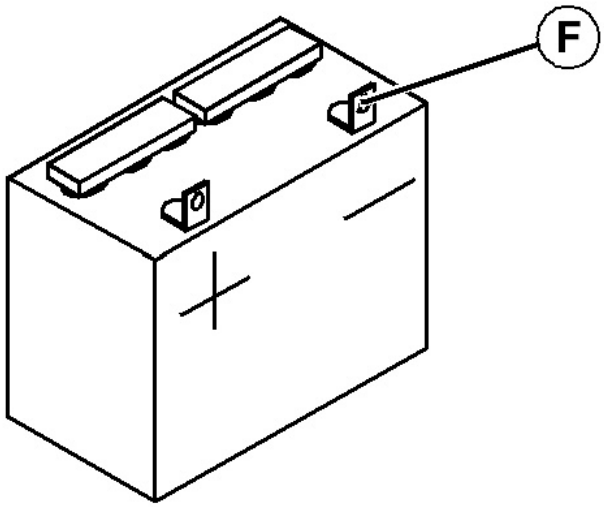
YES: Go to next step.

NO: Check 220 Red/Blk wire and connections.

NO: Check F1 fuse, 220 Red/Blk wire, and connections.

Action:

—



Is the resistance, measured between battery negative post (F) and frame ground connection, 0.1 ohm or less?

Result:

NO: Clean and check battery negative cable. Replace if necessary.

Test Procedure B

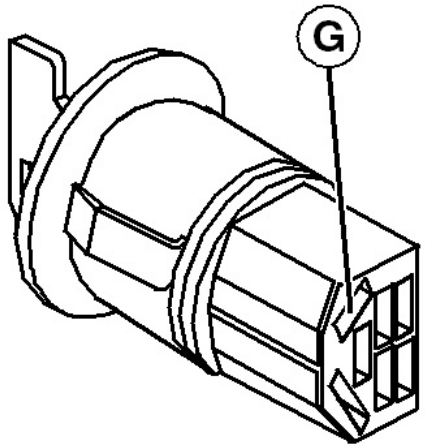
Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake engaged.
- Battery fully charged.
- Ground circuits checked and OK.
- Key switch in run position.
- Engine off.
- PTO in off position.

1 Power Circuit

Action:

—



Is battery present at key switch 401 and 500 wires (G)?

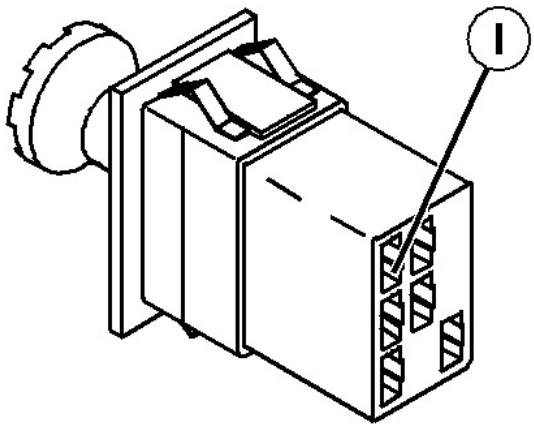
Result:

YES: Go to next step.

NO: Test key switch and replace as necessary.

Action:

—



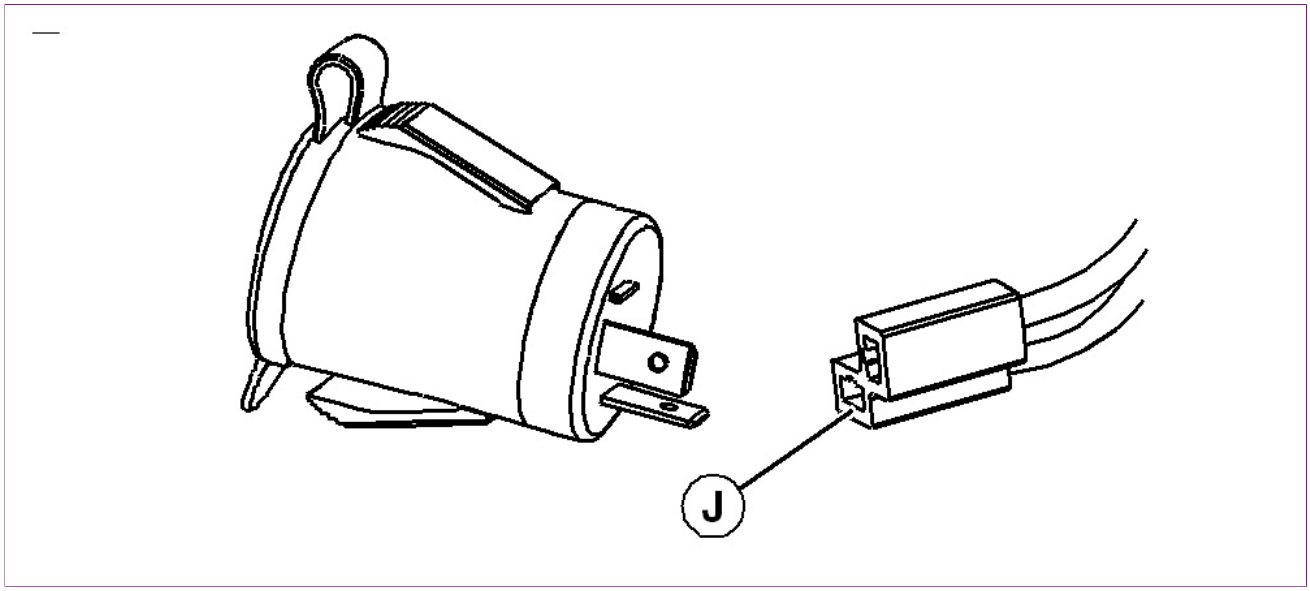
Is battery voltage present at PTO switch 500 and 502 Yel wires (I)?

Result:

YES: Go to next step.

NO: Check 500 Yel wire and connections.

Action:



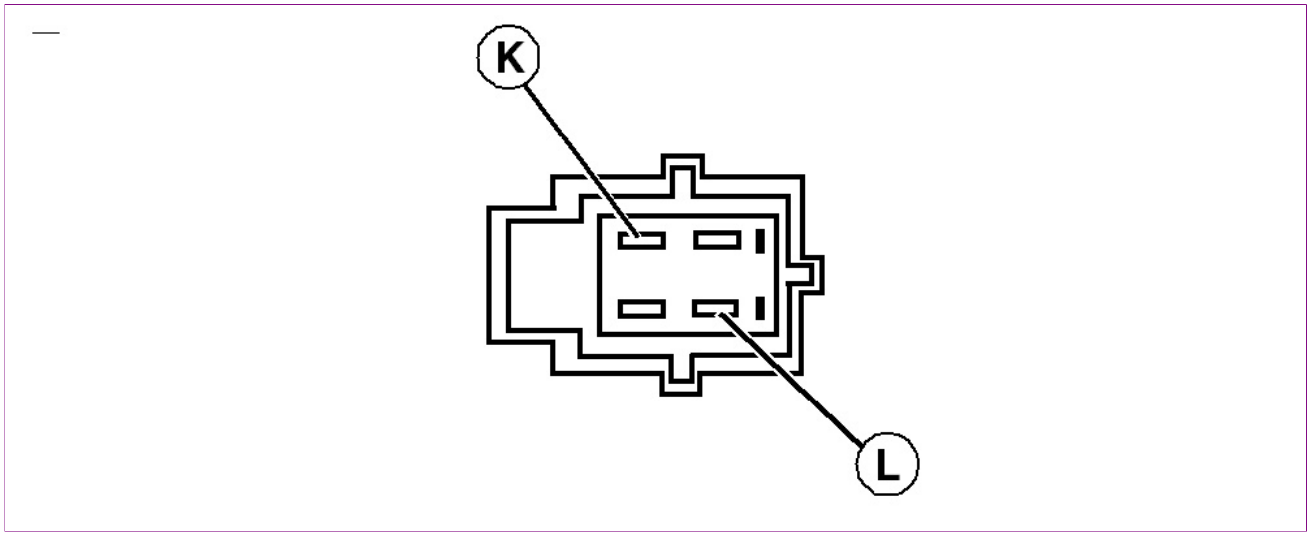
LA165/LA175 Only - Is battery voltage present at ACC power port 401 Yel wire (J)?

Result:

YES: Go to next step.

NO: Check 401 Yel wire and connections.

Action:



Is battery voltage present at P1 hour meter, 502 Yel wire (K)?

Result:

YES: Go to next step.

NO: Check 502 Yel wire and connections.

Action:

Is battery voltage present at P1 power port, 410 Yel wire (L)?

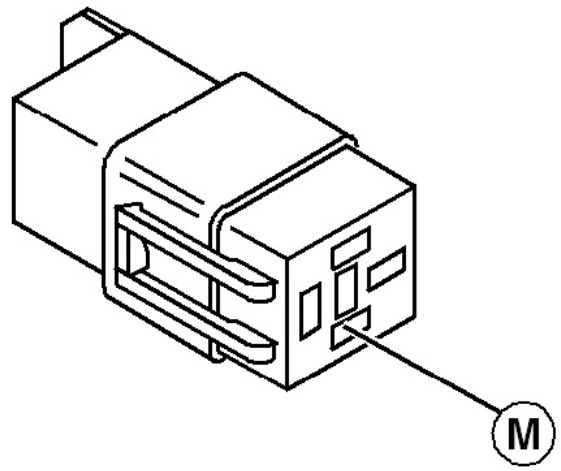
Result:

YES: Go to next step.

NO: Test hour meter. See Hour Meter/Service Indicator Test .

Action:

—



Is battery voltage present a RIO latch relay 410 Yel wire (M)?

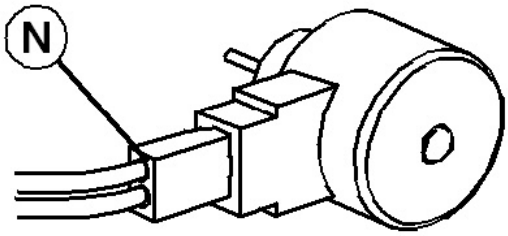
Result:

YES: Go to next step.

NO: Check 410 Yel wire and connections.

Action:

—



Is battery voltage present at fuel shutoff solenoid Gry wire (N)?

Result:

YES: If fuel shutoff solenoid does not click, test solenoid. See Fuel Shutoff Solenoid Test .

NO: Check Gry wire and connections.

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cranking Circuit Operation - All Models

Cranking Circuit Operation - All Models

Function:

To energize the starting motor solenoid and engage the starting motor which cranks the engine.

NOTE:

All models have an inertia starter with a separate starter solenoid and therefore have two positive battery cables (Battery to solenoid and solenoid to starter).

Operating Conditions:

To crank the engine the key switch must be in the start position, the brake must be on and the PTO must be in the off (disengaged) position. The operator does not have to be on the seat to crank the engine with the brake on.

Theory of Operation:

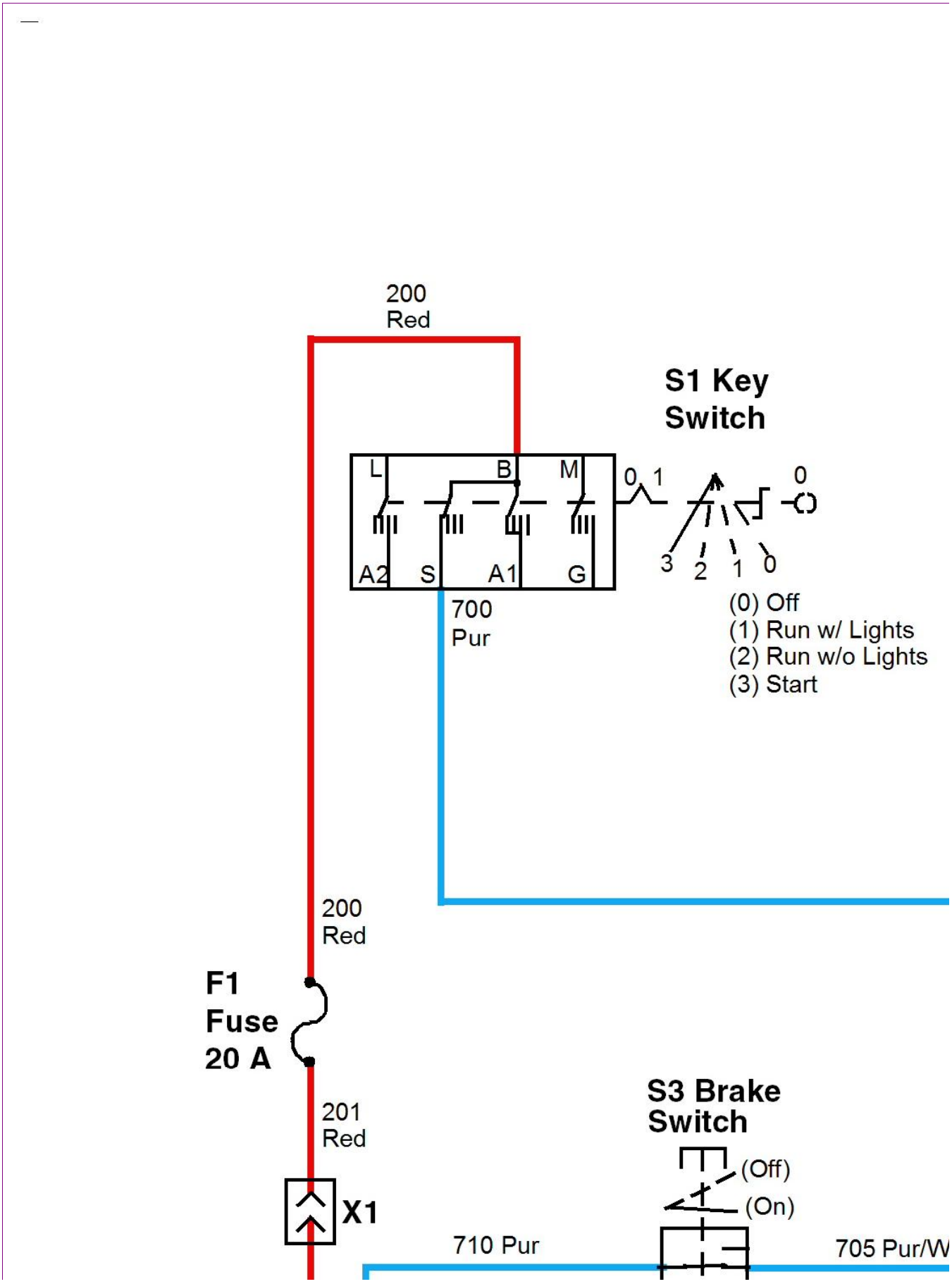
Current flows from the battery through F1 fuse to the key switch. With key switch in the start position, current flows through the key switch, through 700 Pur wire, PTO switch contacts (switch in the off position), 705 Pur/Wht wire, brake switch contacts (brake on), and 710 Pur wire to the starting motor solenoid coil.

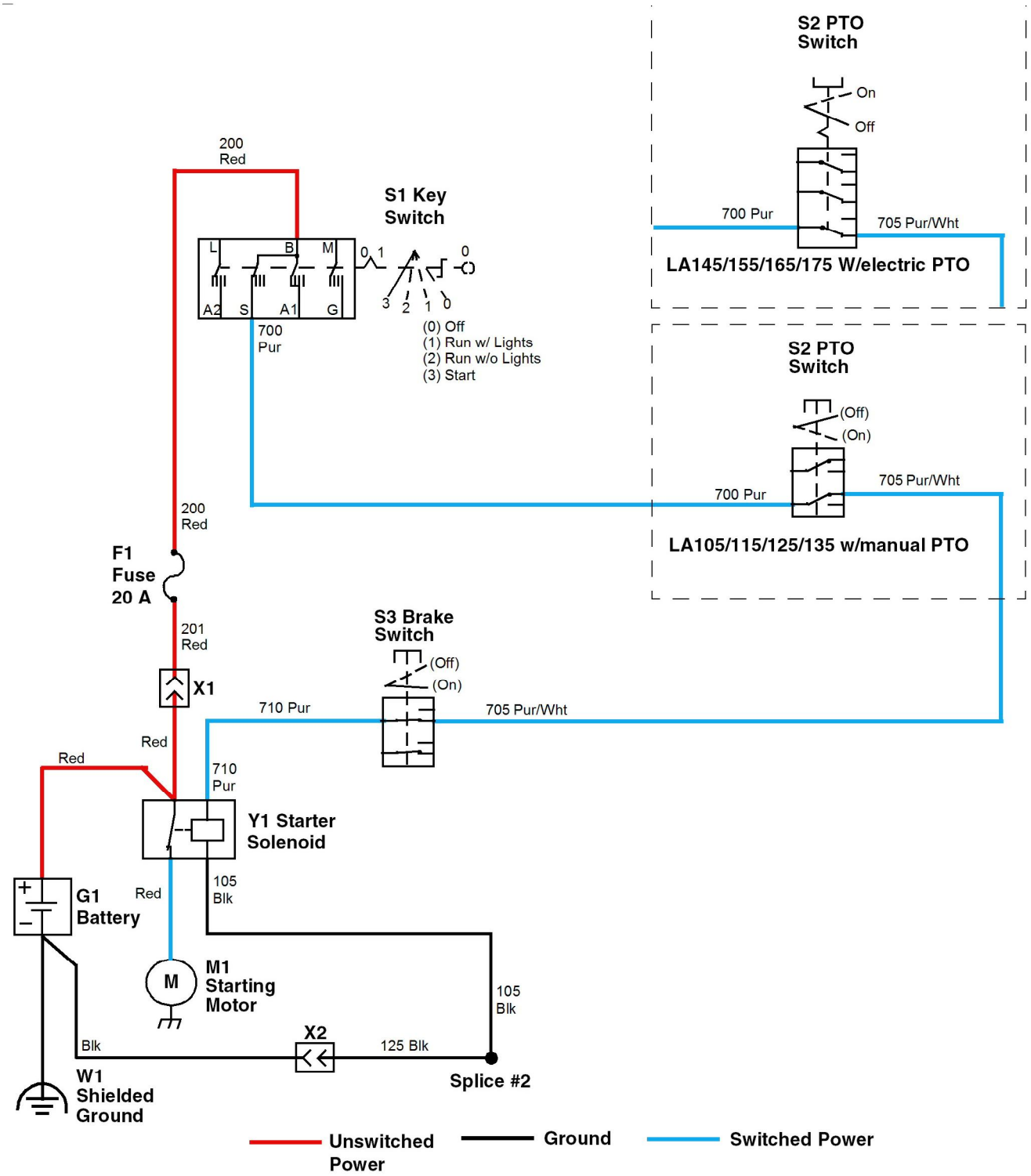
The ground circuit for the solenoid coil is provided through the 105 and 125 Blk wires X2 connector and Blk wire of W4 negative harness and to the negative battery terminal via the negative battery cable.

The ground for the starting motor is the physical connection to the engine and frame ground to the negative battery terminal.

With the solenoid coil energized, the solenoid contacts close and high battery current flows across the solenoid contacts to the starting motor, causing it to crank the engine.

Cranking Circuit Electrical Schematic - All Models


200
Red
S1 Key
Switch
L
B
M
0
1
0
A2
S
A1
G
3
2
1
0
700
Pur
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
200
Red
F1
Fuse
20 A
201
Red
X1
S3 Brake
Switch
(Off)
(On)
710 Pur
705 Pur/W


S2 PTO Switch
On
Off
700 Pur
705 Pur/Wht
LA145/155/165/175 W/electric PTO
S2 PTO Switch
(Off)
(On)
700 Pur
705 Pur/Wht
LA105/115/125/135 w/manual PTO
200 Red
S1 Key Switch
L
B
M
0 1
0
A2
S
A1
G
3 2 1 0
700 Pur
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
200 Red
F1 Fuse 20 A
201 Red
X1
S3 Brake Switch
(Off)
(On)
710 Pur
705 Pur/Wht
Red
Red
710 Pur
Y1 Starter Solenoid
105 Blk
G1 Battery
Red
M
M1 Starting Motor
105 Blk
Blk
X2
125 Blk
W1 Shielded Ground
Splice #2
Unswitched Power
Ground
Switched Power

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Cranking Circuit Diagnosis - All Models

Cranking Circuit Diagnosis - All Models

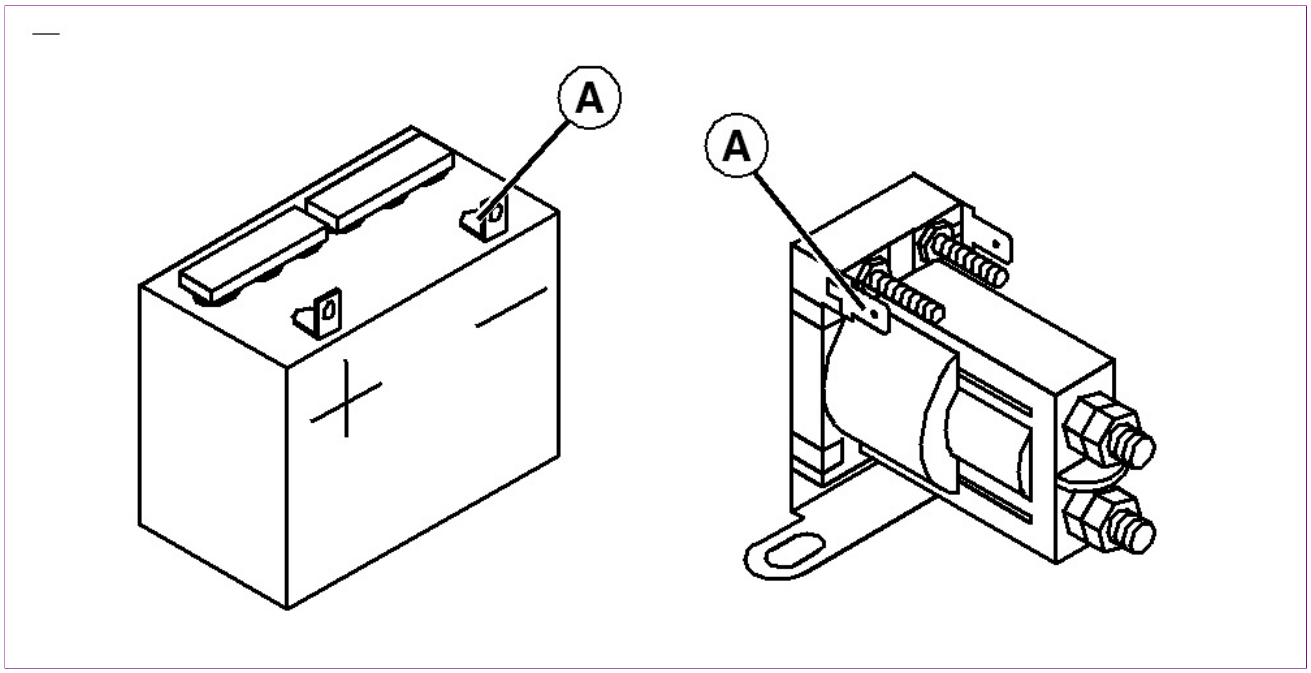
Test Procedure A

Test Conditions:

- Machine parked safely. See “Parking Safely” in the Safety section.
- Park brake engaged.
- Battery fully charged.
- Power circuits checked and OK.
- Ground circuits checked and OK.
- Key switch in off position.
- PTO in off position, or PTO switch in off position.

1 Cranking Circuit

Action:



Is the resistance, measured between negative battery terminal and starter solenoid negative terminal 105 Blk wire (A), 0.2 ohms or less?

Result:

YES: See Test Procedure B .

NO: Check 105 and 125 Blk wires and connections.

Test Procedure B

CAUTION:

To help prevent starting of engine during this test procedure: Disconnect fuel shutoff solenoid connector located near voltage regulator/rectifier. Stay clear of parts that may rotate on the starting motor and engine.

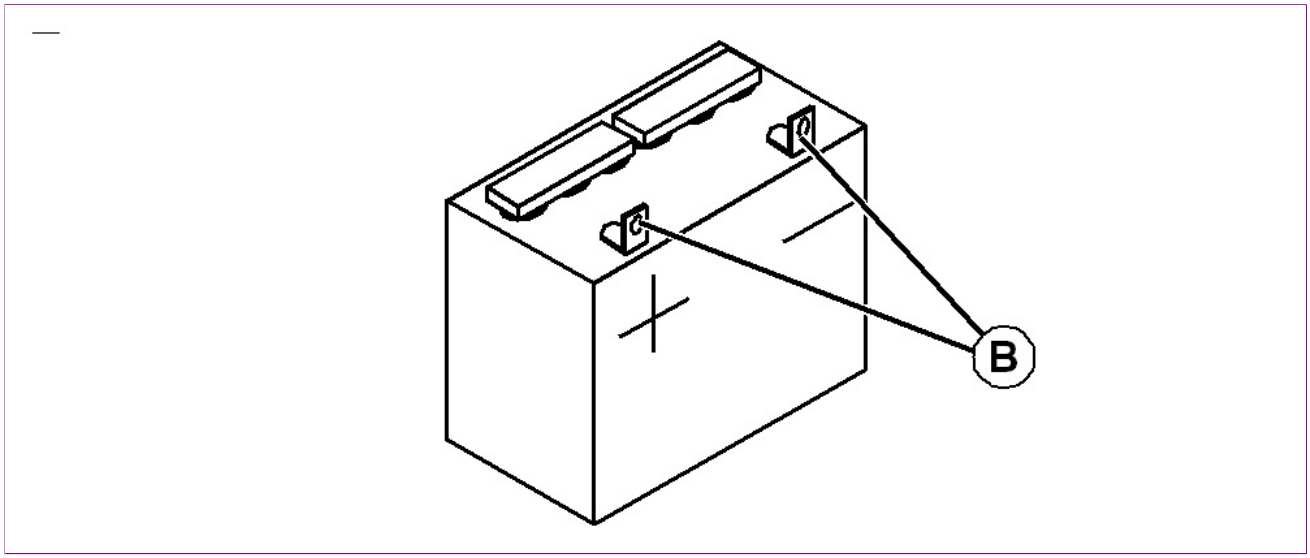
Test Conditions:

- Machine parked safely. See “Parking Safely” in the Safety section.
- Park brake engaged.
- Battery fully charged.
- Power circuits checked and OK.
- Ground circuits checked and OK.
- Fuel shutoff solenoid disconnected.
- Key switch in start position during each test.
- PTO in off position, or PTO switch in off position.

1 Cranking Circuit

Action:

—



Is battery voltage, measured between the posts (B), 12.4 VDC or greater?

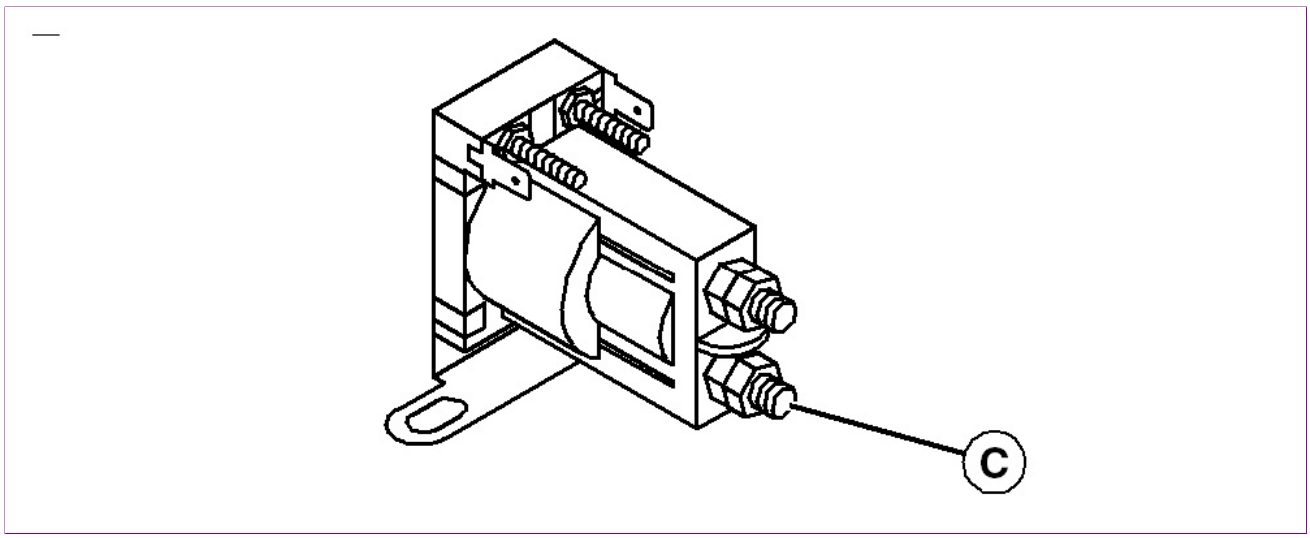
Result:

YES: Go to next step.

NO: Charge battery and retest. Replace battery as necessary.

Action:

—



Is battery voltage present at starting motor solenoid battery terminal (C)?

Result:

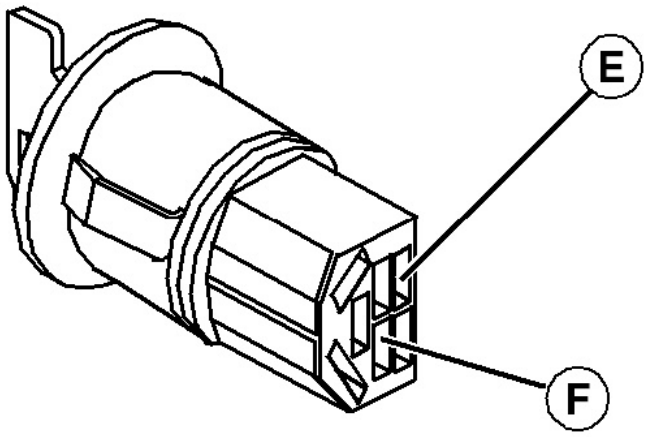
YES: Go to next step.

NO: Clean, check, and tighten connections for battery cable.

NO: Replace battery cable if necessary.

Action:

—



Is battery voltage present at key switch 200 Red wire (E)?

Result:

YES: Go to next step.

NO: Check 201 Red wire, F1 fuse, 200 Red wire and connections.

Action:

Is battery voltage present at key switch 700 Pur wire (F)?

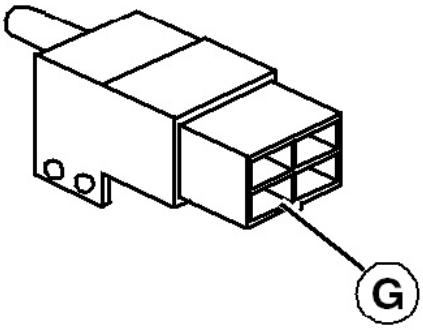
Result:

YES: Go to next step.

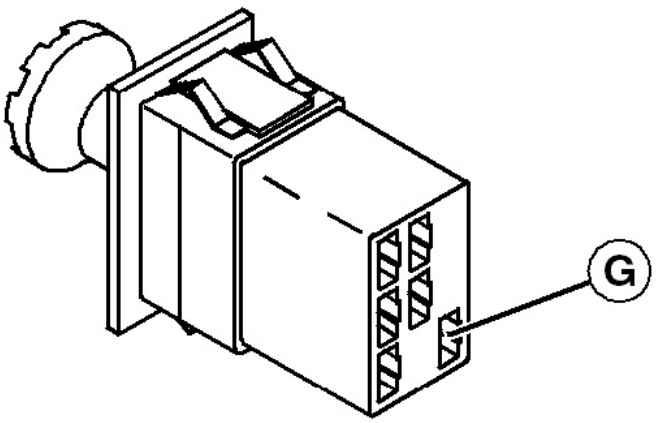
NO: Test key switch and replace as necessary.

Action:

—



LA105/115/125/135



LA145/165/175

Is battery voltage present at PTO switch 705 Pur/Wht wire (G)?

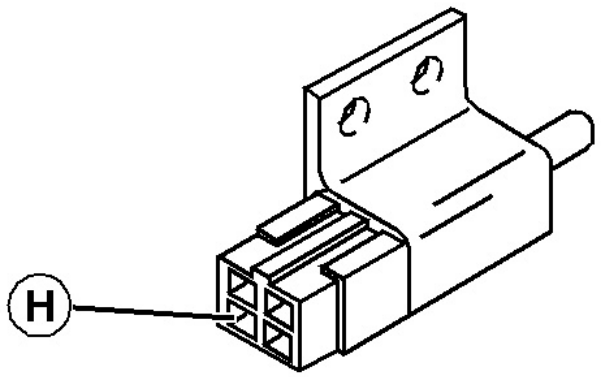
Result:

YES: Go to next step.

NO: Check 700 Pur wire and connections. If OK, replace PTO switch.

Action:

—



Is battery voltage present at brake switch 710 Pur wire (H)?

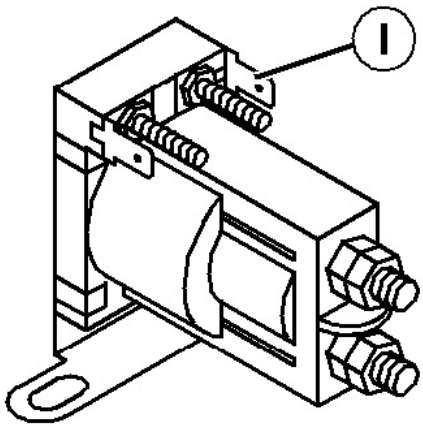
Result:

YES: Go to next step.

NO: Check 705 Pur/Wht wire and connections. If OK, replace brake switch.

Action:

—



Is battery voltage present at starting motor solenoid 710 Pur wire (I)?

Result:

YES: Test starting motor solenoid. See Starting Solenoid Test - L100/L105/L107/L110/L120/L130 . If OK, test starting motor.

YES: Check 710 Pur wire and connections.

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Ignition and Shutoff Circuit Operation - All Models

Ignition and Shutoff Circuit Operation - All Models

Function:

To create a spark at the correct time that ignites the fuel/air mixture in the cylinder(s). To keep the engine running by eliminating ground paths to both sides of the ignition module(s) primary coil.

Operating Conditions:

To produce a spark, the key switch must be in the start or run position. The operator can be on or off the seat; however, the PTO must be disengaged and the brake switch must be engaged (brake pedal depressed or park brake on) to start the engine.

Once the engine is running, the operator must be on the seat to disengage the brake or engage the PTO.

The engine will shut off when the key switch is turned to the off position, the operator leaves the seat without locking the parking brake and disengaging the PTO, or the operator places the machine in reverse with the PTO engaged and not pressing the RIS switch to its momentary on position to energize the RIO latch relay.

System Operation:

The ignition system is a transistor-controlled magneto design. Ignition timing is controlled by the transistor and is not adjustable. The engine is shut off by grounding both sides of the ignition primary coil(s). With the ignition primary coil(s) grounded, a spark cannot be produced.

When the engine is turning over, the flywheel magnet induces current into the magneto ignition coil(s), which in turn produces current high enough to jump the spark plug gap, creating a spark to ignite the engine fuel/air mixture.

Placing the key switch in the start or run position eliminates the path to ground for the Wht wire from the engine magneto, 940 and 941 Wht wires, key switch contacts (normally closed), 100, and 125 Blk wires.

The seat switch controls two paths to ground. When the operator is on the seat, the brake and PTO switches can be either on or off. These paths are eliminated when the operator is on the seat (seat switch open). This condition breaks the ground circuit 940 and 942 Wht wires, brake switch, 945 Wht/Blk wire, and 130, 110, and 125 Blk wires. This condition also breaks the ground circuit 940 and 943 Wht wires, PTO switch, 949 Wht/Blk wire, 951 Blk/Wht wire, seat switch, and 111, 130, 120, 110, and 125 Blk wires.

All Models:

If the operator is off the seat (seat switch closed), then the brake switch must be on (park brake engaged) and the PTO must be off (disengaged).

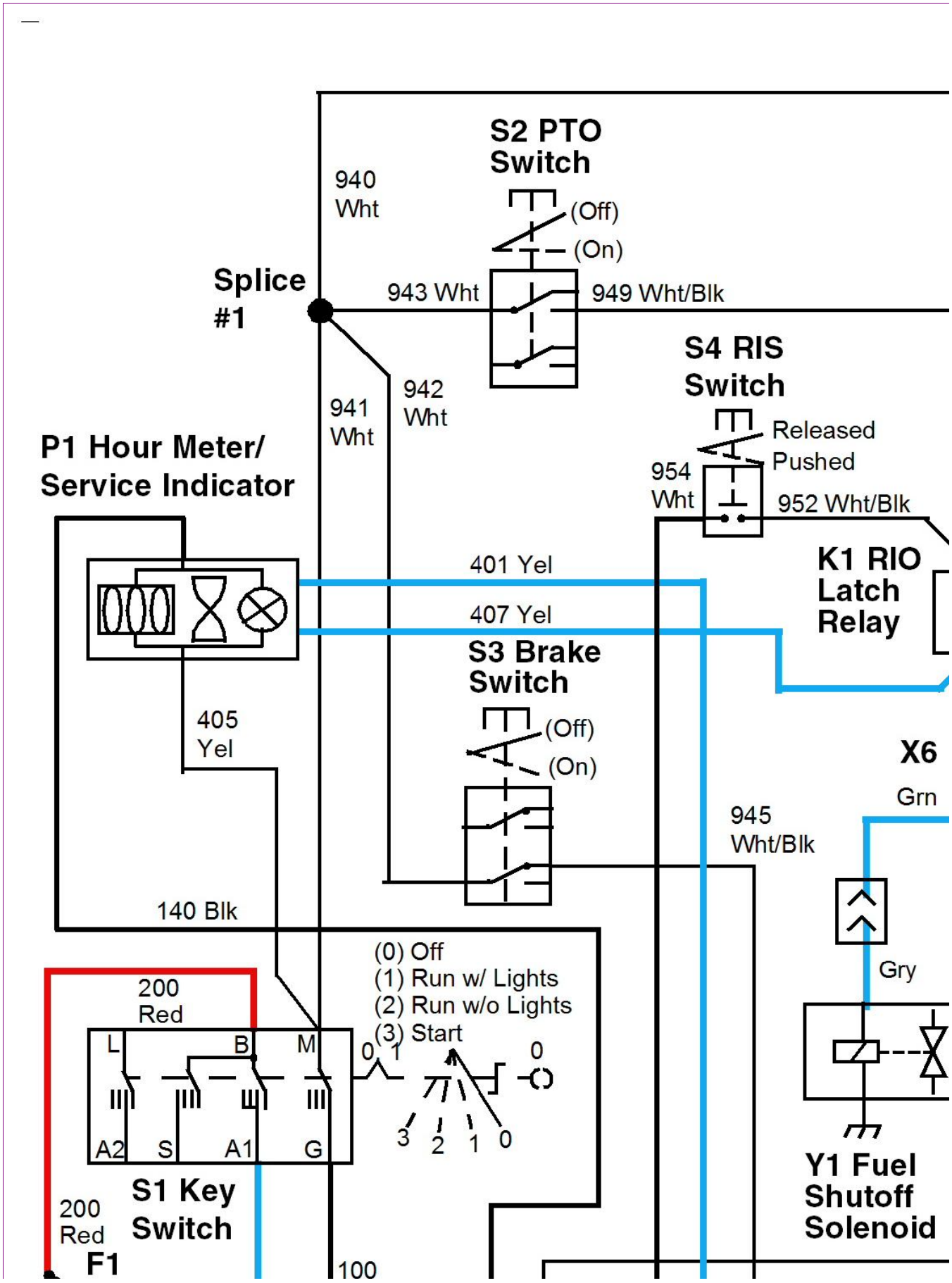
If the operator is off the seat and the brake switch is also off this creates the ground circuit path 940, 942 Wht wires, brake switch, 945 Wht/Blk, seat switch, 130, 110, and 125 Blk wires.

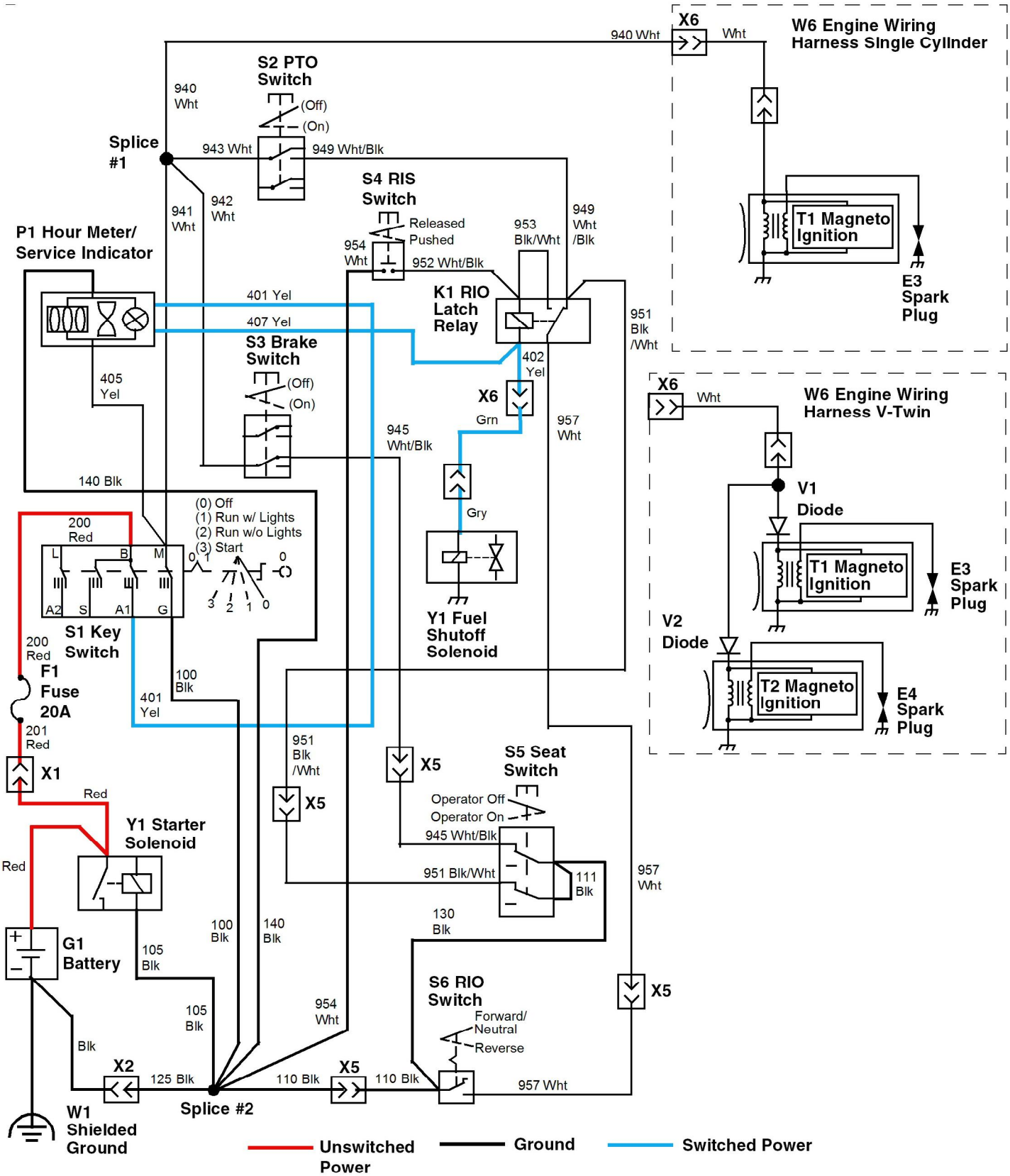
If the operator is off the seat and the PTO is on, this creates the ground circuit 940, 943 Wht wires, PTO switch, 949 Wht/Blk, 951 Blk/Wht, seat switch, and 111, 130, 120 (LA145/155/165/175), 110, and 125 Blk wires to the W4 negative jumper wiring harness.

An additional path to ground will be created with the engine running if the operator places the machine in reverse while the PTO is engaged and the RIS switch is not pressed to its momentary on position to energize the RIO latch relay. This condition also creates the ground circuit 940, 943 Wht wires, PTO switch, 949 Wht/Blk wire, RIO latch relay (normally closed contacts) 957 Wht wire, RIO switch (normally open contacts), 120 (LA145/155/165/175), 110, and 125 Blk wires to ground.

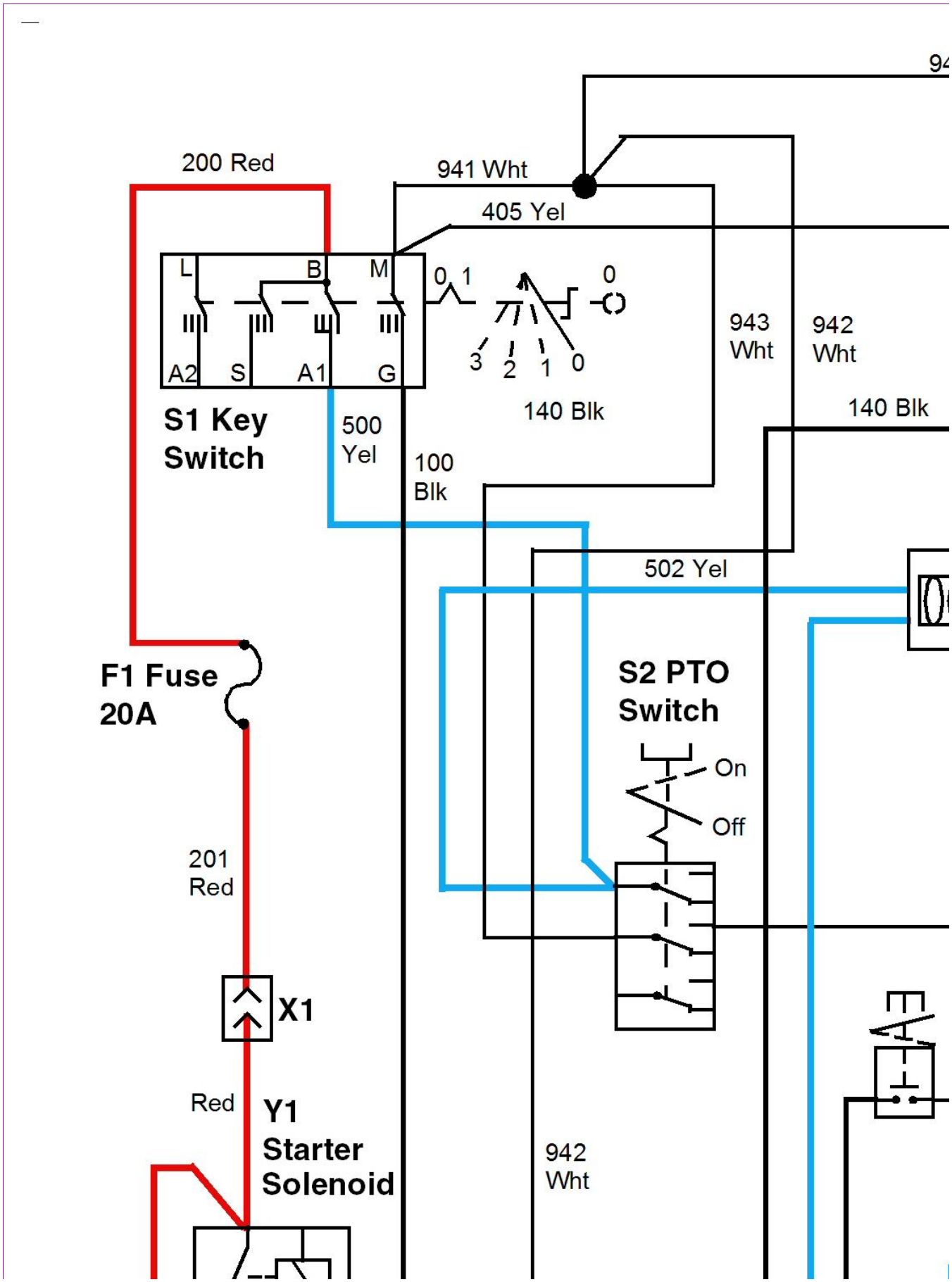
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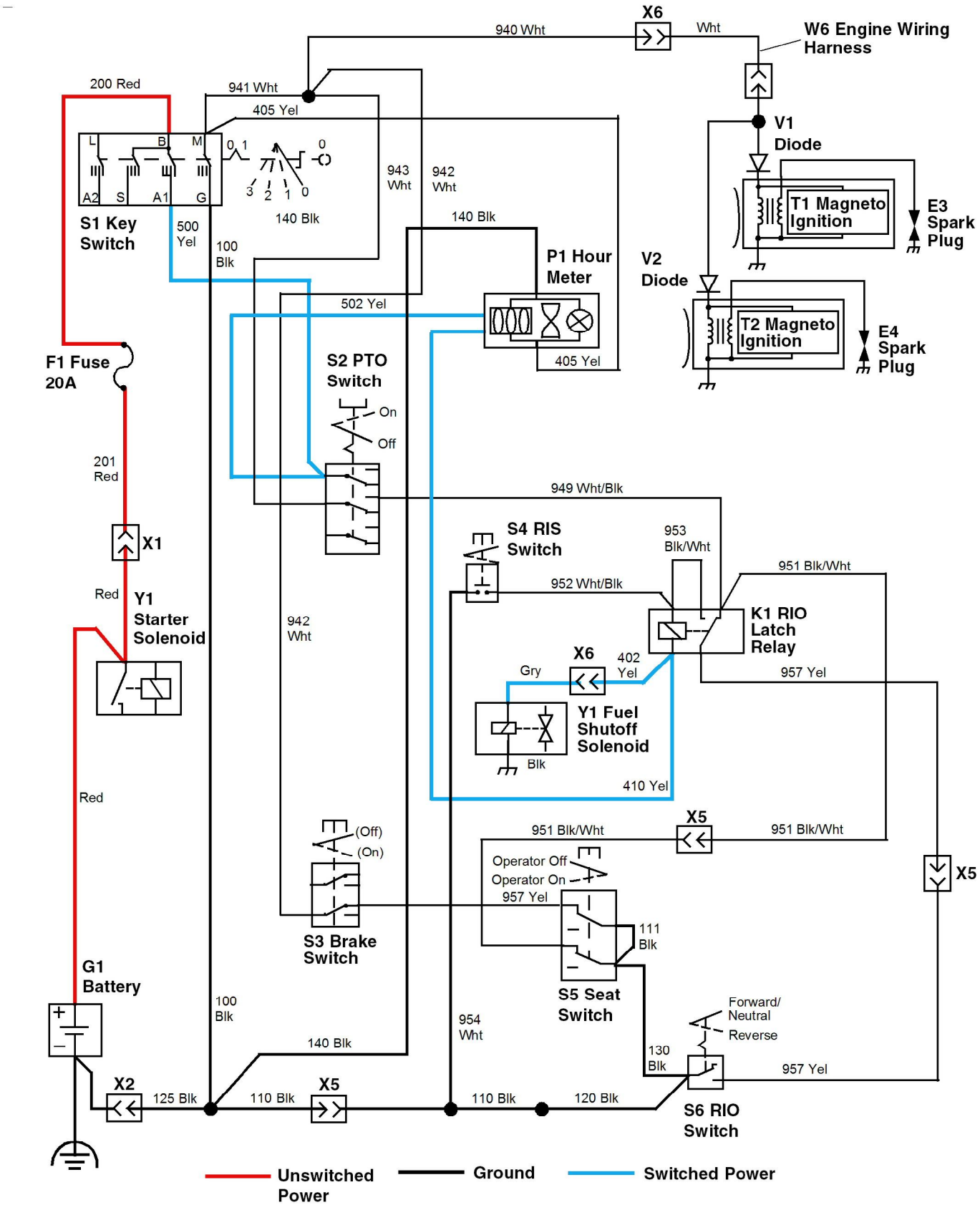
Ignition and Shutoff Circuit Electrical Schematic - LA105/115/125/135


S2 PTO Switch
940 Wht
(Off)
(On)
Splice #1
943 Wht
949 Wht/Blk
941 Wht
942 Wht
S4 RIS Switch
Released
Pushed
954 Wht
952 Wht/Blk
P1 Hour Meter/ Service Indicator
401 Yel
407 Yel
K1 RIO Latch Relay
S3 Brake Switch
405 Yel
(Off)
(On)
X6
Grn
945 Wht/Blk
140 Blk
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
200 Red
L
B
M
0
1
0
3
2
1
0
A2
S
A1
G
S1 Key Switch
Gry
Y1 Fuel Shutoff Solenoid
200 Red
F1
100


X6
940 Wht
Wht
W6 Engine Wiring Harness Single Cylinder
T1 Magneto Ignition
E3 Spark Plug
S2 PTO Switch
(Off)
(On)
940 Wht
Splice #1
943 Wht
949 Wht/Blk
941 Wht
942 Wht
S4 RIS Switch
Released
Pushed
954 Wht
952 Wht/Blk
953 Blk/Wht
949 Wht /Blk
P1 Hour Meter/ Service Indicator
401 Yel
407 Yel
K1 RIO Latch Relay
951 Blk /Wht
S3 Brake Switch
(Off)
(On)
405 Yel
402 Yel
X6
Grn
957 Wht
945 Wht/Blk
140 Blk
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
200 Red
L
B
M
A2
S
A1
G
S1 Key Switch
Gry
Y1 Fuel Shutoff Solenoid
X6
Wht
W6 Engine Wiring Harness V-Twin
V1 Diode
T1 Magneto Ignition
E3 Spark Plug
V2 Diode
T2 Magneto Ignition
E4 Spark Plug
200 Red
F1 Fuse 20A
100 Blk
401 Yel
201 Red
X1
951 Blk /Wht
X5
X5
S5 Seat Switch
Operator Off
Operator On
945 Wht/Blk
951 Blk/Wht
111 Blk
957 Wht
130 Blk
Red
Y1 Starter Solenoid
Red
100 Blk
140 Blk
G1 Battery
105 Blk
105 Blk
954 Wht
S6 RIO Switch
Forward/ Neutral
Reverse
X5
Blk
X2
125 Blk
110 Blk
X5
110 Blk
957 Wht
W1 Shielded Ground
Splice #2
Unswitched Power
Ground
Switched Power

Ignition and Shutoff Circuit Electrical Schematic - LA145/155/165/175


200 Red
941 Wht
405 Yel
L
B
M
A2
S
A1
G
0 1
0
3 2 1 0
140 Blk
943 Wht
942 Wht
140 Blk
S1 Key Switch
500 Yel
100 Blk
502 Yel
F1 Fuse 20A
S2 PTO Switch
On
Off
201 Red
X1
Red
Y1 Starter Solenoid
942 Wht


X6
940 Wht
Wht
W6 Engine Wiring Harness
200 Red
941 Wht
405 Yel
V1 Diode
L
B
M
A2
S
A1
G
0 1
0
3 2 1 0
140 Blk
S1 Key Switch
500 Yel
100 Blk
943 Wht
942 Wht
140 Blk
P1 Hour Meter
T1 Magneto Ignition
E3 Spark Plug
V2 Diode
T2 Magneto Ignition
E4 Spark Plug
502 Yel
405 Yel
F1 Fuse 20A
S2 PTO Switch
On
Off
201 Red
949 Wht/Blk
X1
S4 RIS Switch
953 Blk/Wht
951 Blk/Wht
952 Wht/Blk
Red
Y1 Starter Solenoid
942 Wht
K1 RIO Latch Relay
X6
Gry
402 Yel
957 Yel
Y1 Fuel Shutoff Solenoid
Blk
410 Yel
Red
X5
951 Blk/Wht
951 Blk/Wht
(Off)
(On)
Operator Off
Operator On
957 Yel
111 Blk
S3 Brake Switch
S5 Seat Switch
G1 Battery
100 Blk
954 Wht
Forward/ Neutral
Reverse
130 Blk
957 Yel
140 Blk
X2
125 Blk
110 Blk
X5
110 Blk
120 Blk
S6 RIO Switch
Unswitched Power
Ground
Switched Power

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Ignition and Shutoff Circuit Diagnosis - All Models

Ignition and Shutoff Circuit Diagnosis - All Models

Test Procedure A

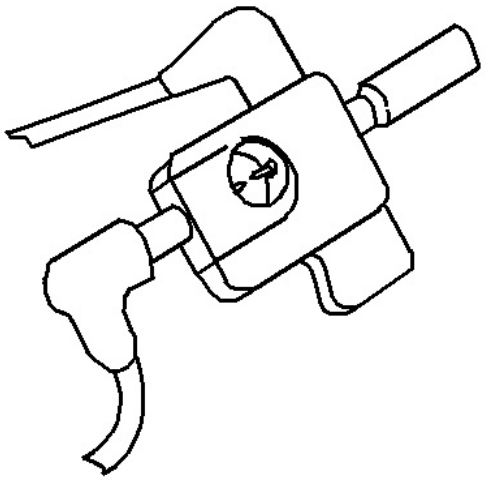
Test Conditions:

- Machine parked safely. See “Parking Safely” in the Safety section.
- Park brake on.
- Battery fully charged.
- Power circuits checked and OK.
- Ground circuits checked and OK.
- Engine running.
- PTO in off position.
- Ignition test tools installed.

1 Ignition and Shutoff Circuit

Action:

—



Install ignition tester and check spark output(s). Are spark output(s) correct?

Result:

NO: See Test Procedure B .

Test Procedure B

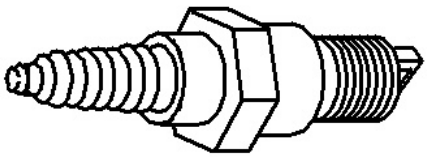
Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake on.
- Battery fully charged.
- Key switch in off position.
- PTO in off position.
- Engine cool to avoid burns.

1 Ignition and Shutoff Circuit

Action:

—



Visually inspect spark plug(s). Check air gap(s). Are spark plug(s) in good condition?

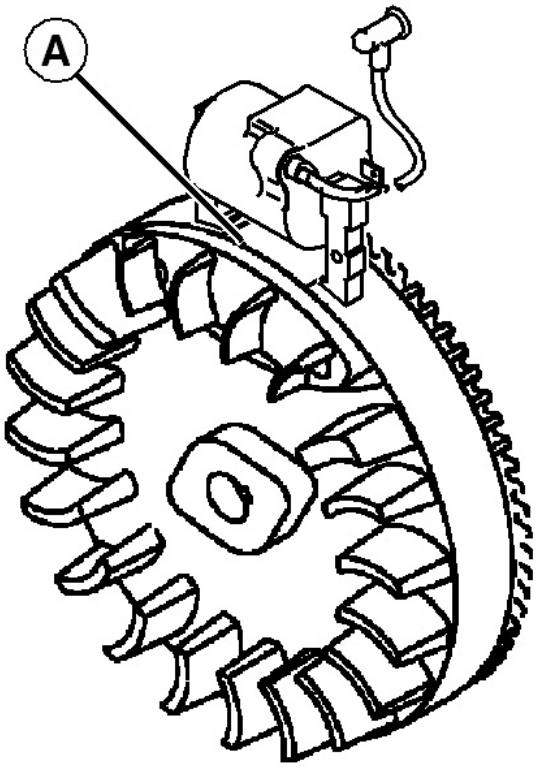
Result:

YES: Go to next step.

NO: Replace spark plug(s). If problem persists, go to next step.

Action:

—



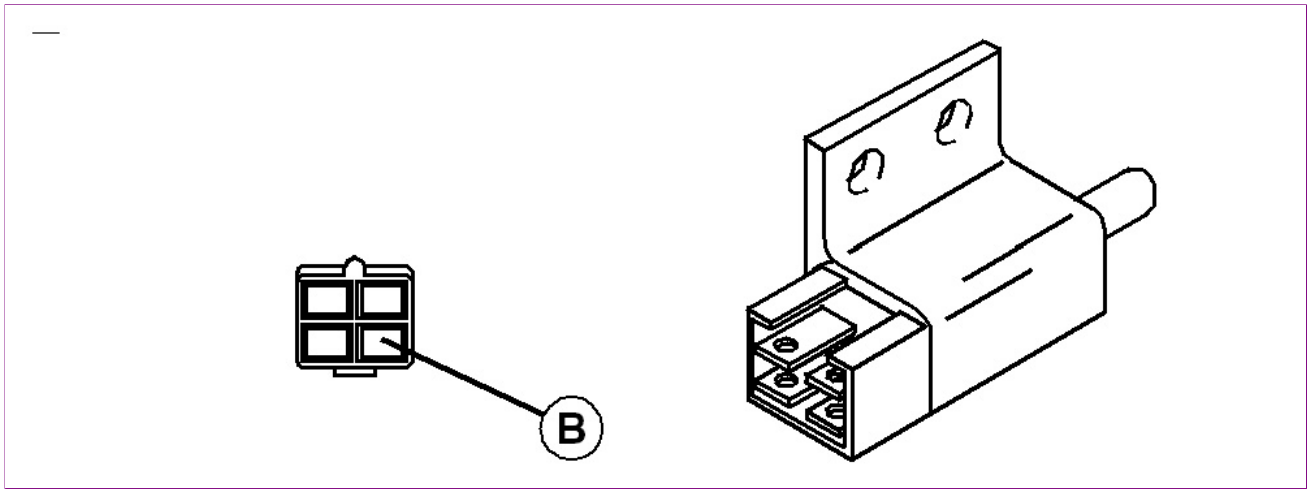
Check magneto to flywheel air gap(s) (A). See Armature Air Gap Adjustment . Are air gap(s) correct?

Result:

YES: Go to next step.

NO: Adjust air gap(s). See engine section for procedure. If problem persists, go to next step.

Action:



Disconnect S3 brake switch. Is continuity present between 945 Wht/Blk wire (B) at brake switch and ground?

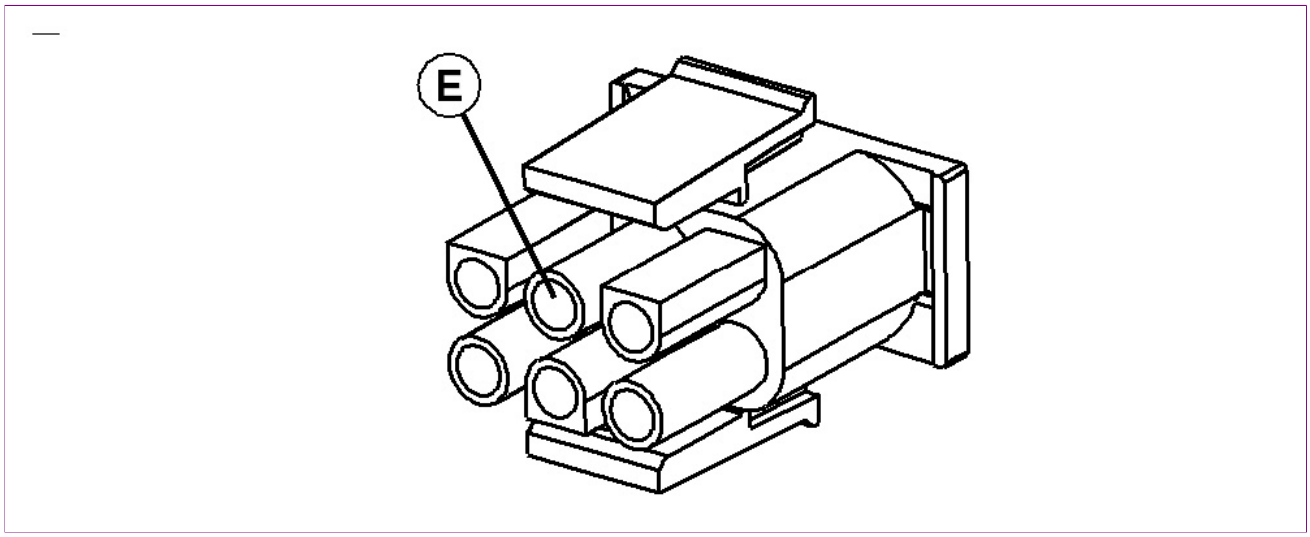
Result:

YES: Go to next step.

NO: Test brake switch. See PTO/Brake Switch Test - L100/L105/L107/L110 .

NO: Check 100, (115 if applicable), 125 Blk wires, and connections.

Action:



Is continuity to ground present at X6 front main wiring harness connector 940 Wht wire (E)?

Result:

YES: Check 941 and 940 Wht wires and connections. If OK, See Test Procedure C .

NO: Test key switch. See Key Switch Test . If OK, see See Test Procedure C .

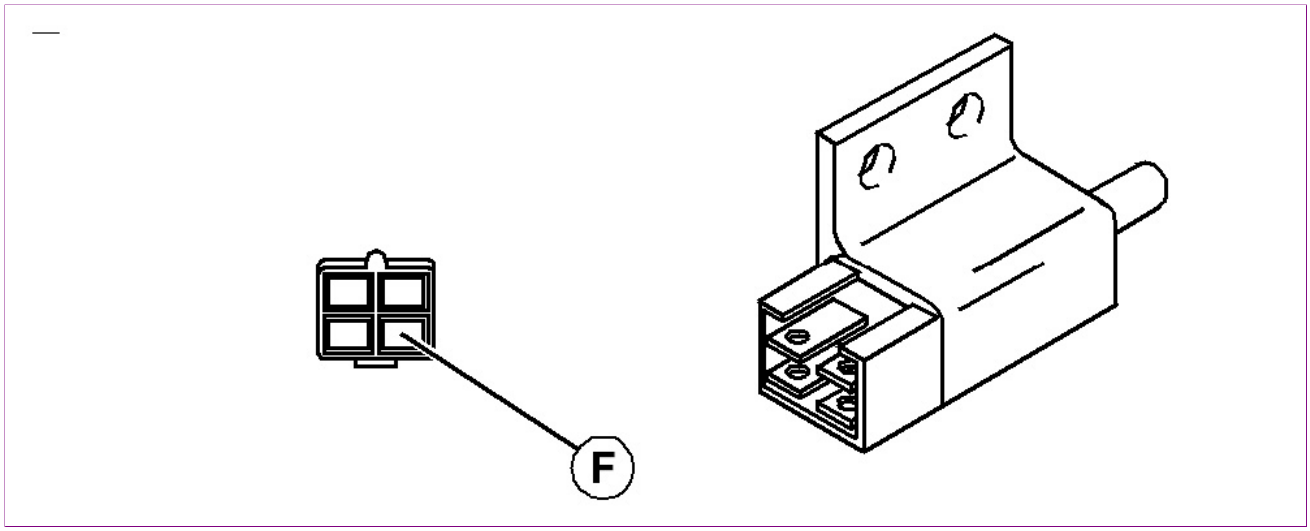
Test Procedure C

Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake off.
- Battery fully charged.
- Key switch in run position engine not running.
- PTO in off position.
- Operator off seat.

1 Ignition and Shutoff Circuit

Action:



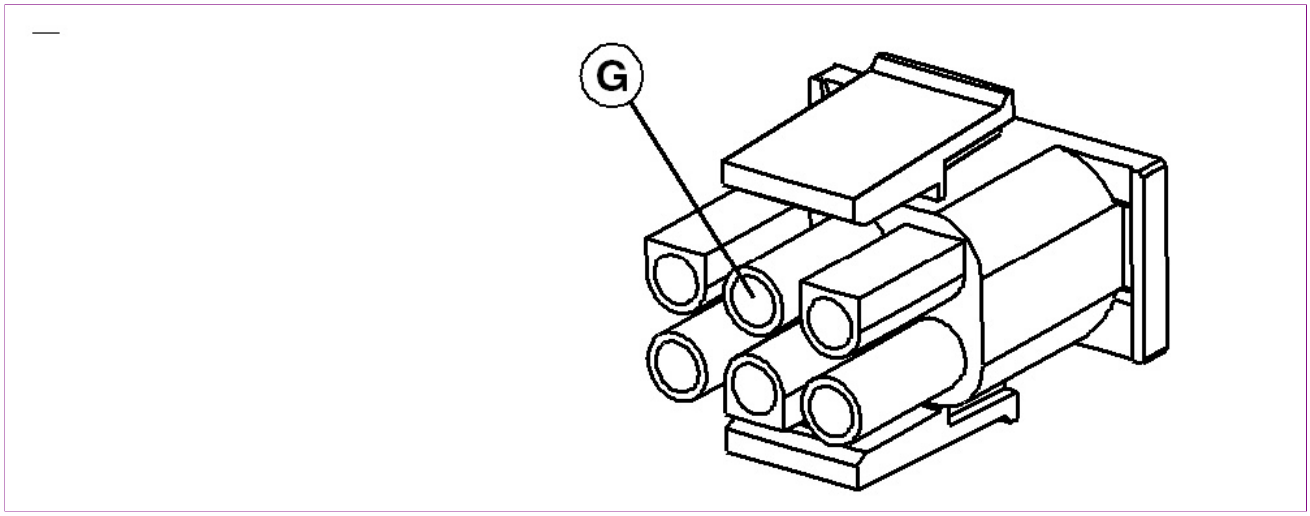
Disconnect S3 brake switch. Is continuity present between 945 Wht/Blk wire (F) at brake switch connector and ground?

Result:

YES: Test seat switch and replace as necessary. If problem persists, go to next step.

NO: Check 945 Wht/Blk, 111, 130, 110, 120 Blk wires, and connections.

Action:



Is continuity present between 940 Wht wire (G) and ground?

Result:

YES: See Test Procedure D .

NO: Check 942 and 940 Wht wires and connections.

Test Procedure D

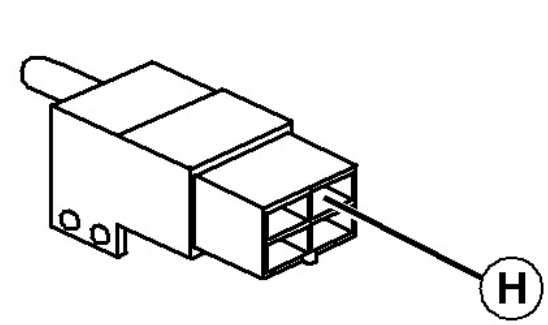
Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake on.
- Battery fully charged.
- Key switch in run position, engine not running.
- PTO in on position.
- Operator off seat.

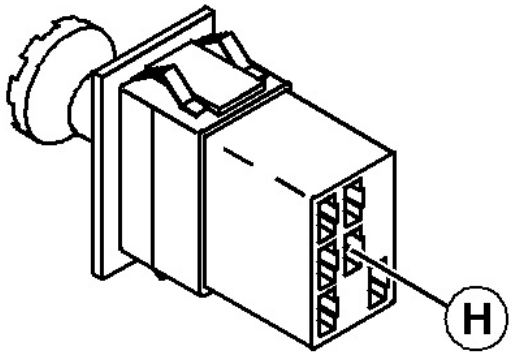
1 Ignition and Shutoff Circuit

Action:

—



LA105/115/125/135



LA145/165/175

Disconnect S2 PTO switch. Is continuity present between 949 Wht/Blk wire (H) at S2 PTO switch plug and ground?

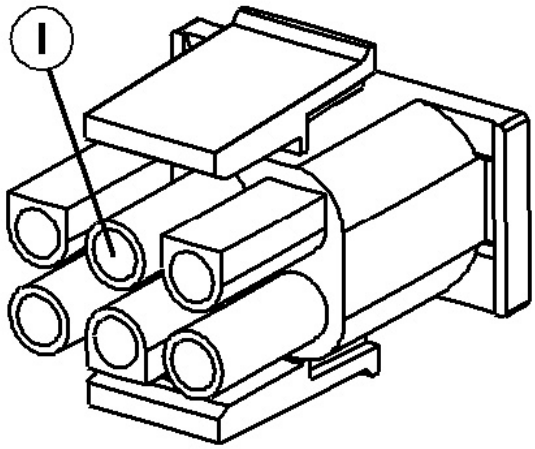
Result:

YES: See Test Procedure D .

NO: Check 949 Wht/Blk, 951 Blk/Wht, 130, 110, 125 Blk wires, and connections.

Action:

—



Is continuity present between 940 Wht wire (I) and ground?

Result:

NO: Check 943 and 940 Wht wires and connections.

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Charging Circuit Operation

Charging Circuit Operation

Function:

To maintain battery voltage at 12.4 volts or higher.

Operating Conditions:

The engine must be running for the charging system to operate.

System Operation:

The charging system is a permanent magnet and stator design.

Charging output is controlled by the N1 voltage regulator/rectifier.

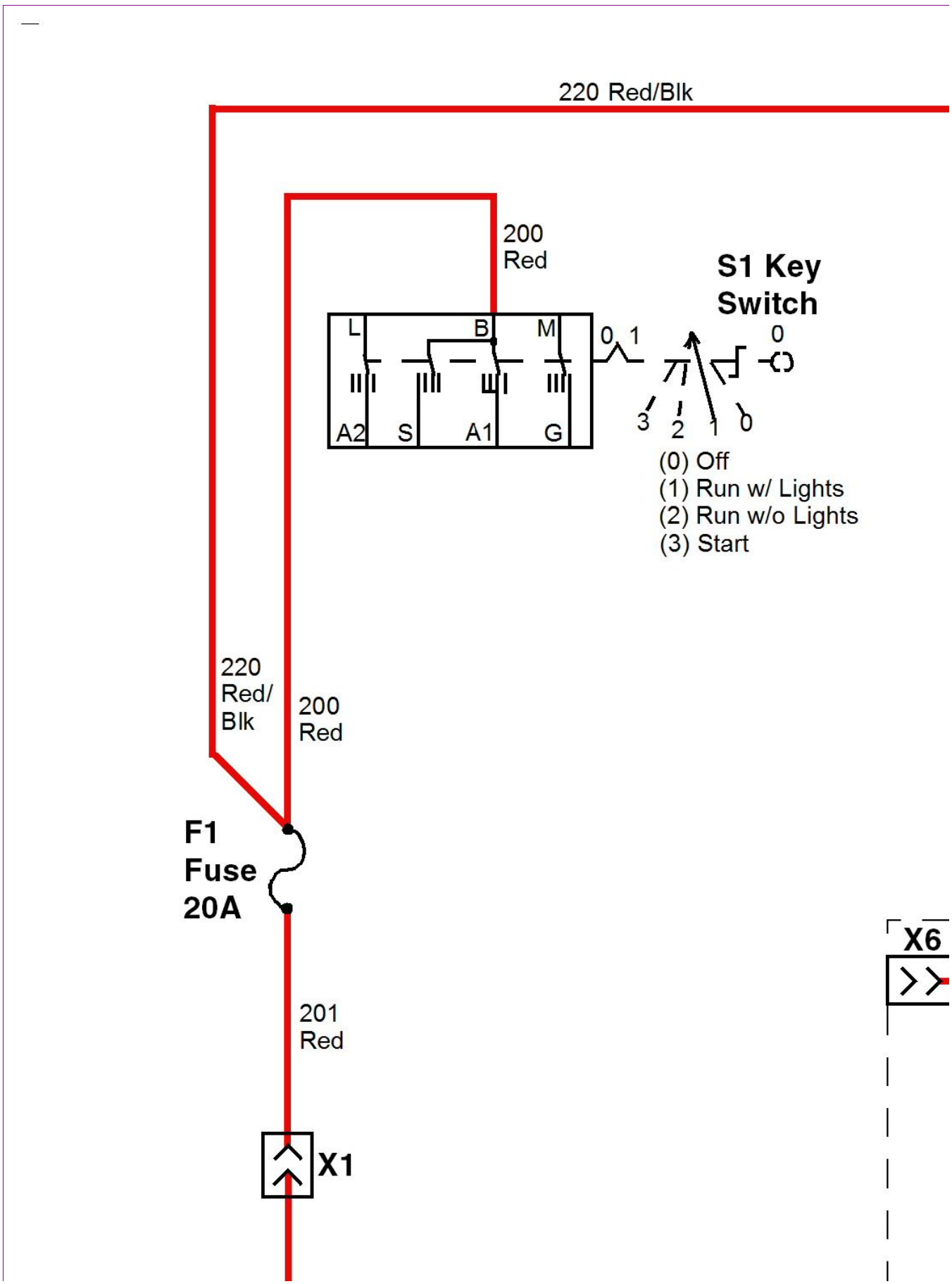
With the engine running, current flows from the G2 stator to the N1 voltage regulator/rectifier to the battery positive (+) terminal through the Red wire, X6 connector, 220 Red/Blk wire, F1 fuse, 201 Red wire to the Y1 starter solenoid and finally to the positive battery cable. The circuit allows the voltage regulator/rectifier to charge the battery.

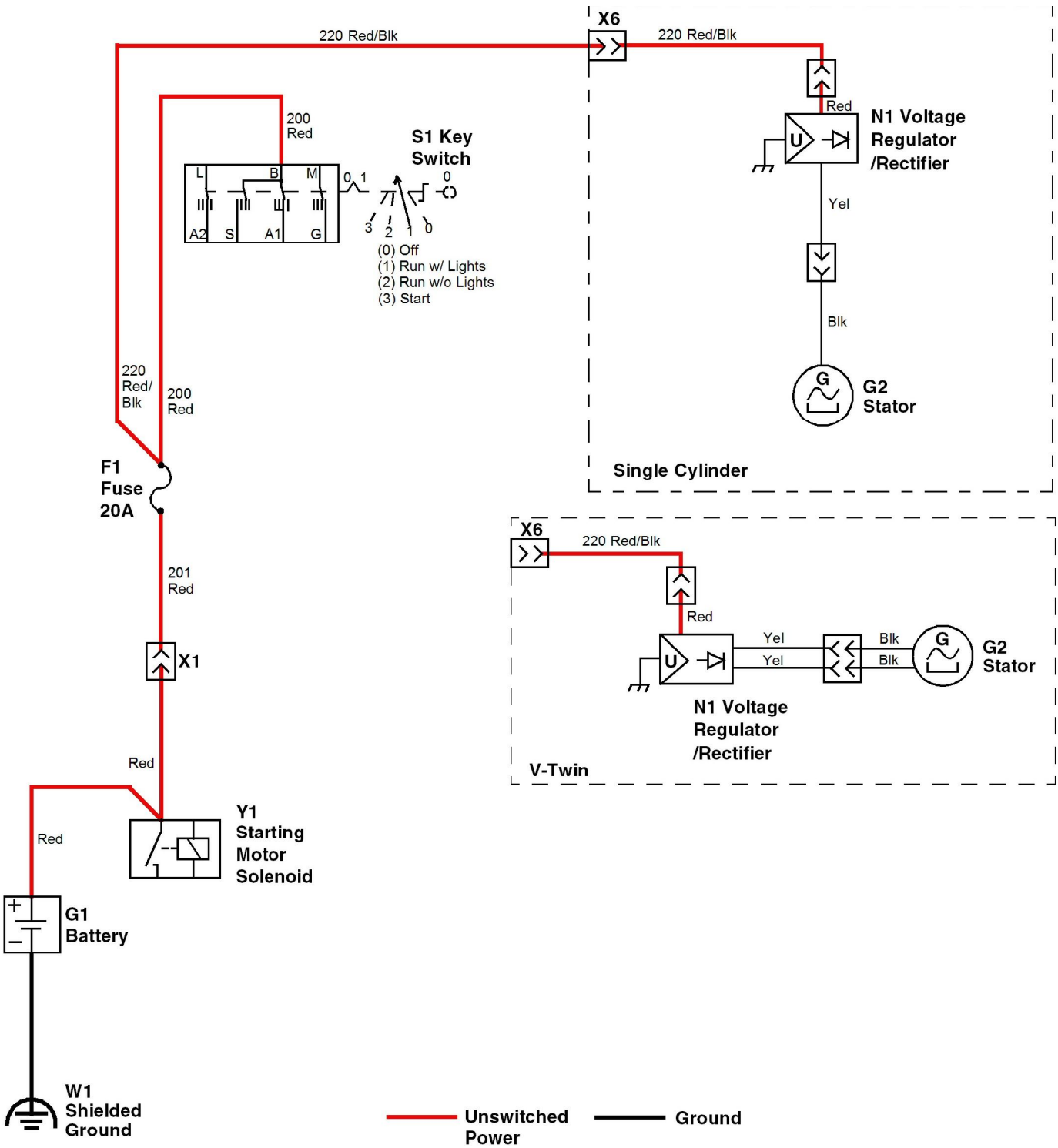
As the flywheel turns, a permanent magnet located in the flywheel induces AC current in the G2 stator windings. The AC current flows to the regulator/rectifier. The regulator/rectifier converts the AC current to DC current needed to charge the battery.

When voltage drops below 14.7 VDC, the voltage regulator/rectifier allows DC current to flow to the battery to charge it. As the battery becomes fully charged, the regulator reduces current flow to the battery.

20051019142311-19-2007073108

Charging Circuit Electrical Schematic - All Models


220 Red/Blk
200
Red
S1 Key
Switch
L
B
M
0 1
0
A2
S
A1
G
3 2 1 0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
220
Red/
Blk
200
Red
F1
Fuse
20A
201
Red
X1
X6


X6
220 Red/Blk
220 Red/Blk
Red
N1 Voltage
Regulator
/Rectifier
U
Yel
Blk
G
G2
Stator
Single Cylinder
200
Red
S1 Key
Switch
L
B
M
0 1
0
A2
S
A1
G
3 2 1 0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
220
Red/
Blk
200
Red
F1
Fuse
20A
201
Red
X1
Red
Red
Y1
Starting
Motor
Solenoid
G1
Battery
W1
Shielded
Ground
X6
220 Red/Blk
Red
U
Yel
Yel
Blk
Blk
G
G2
Stator
N1 Voltage
Regulator
/Rectifier
V-Twin
Unswitched
Power
Ground

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Charging Circuit Diagnosis - All Models

Charging Circuit Diagnosis - All Models

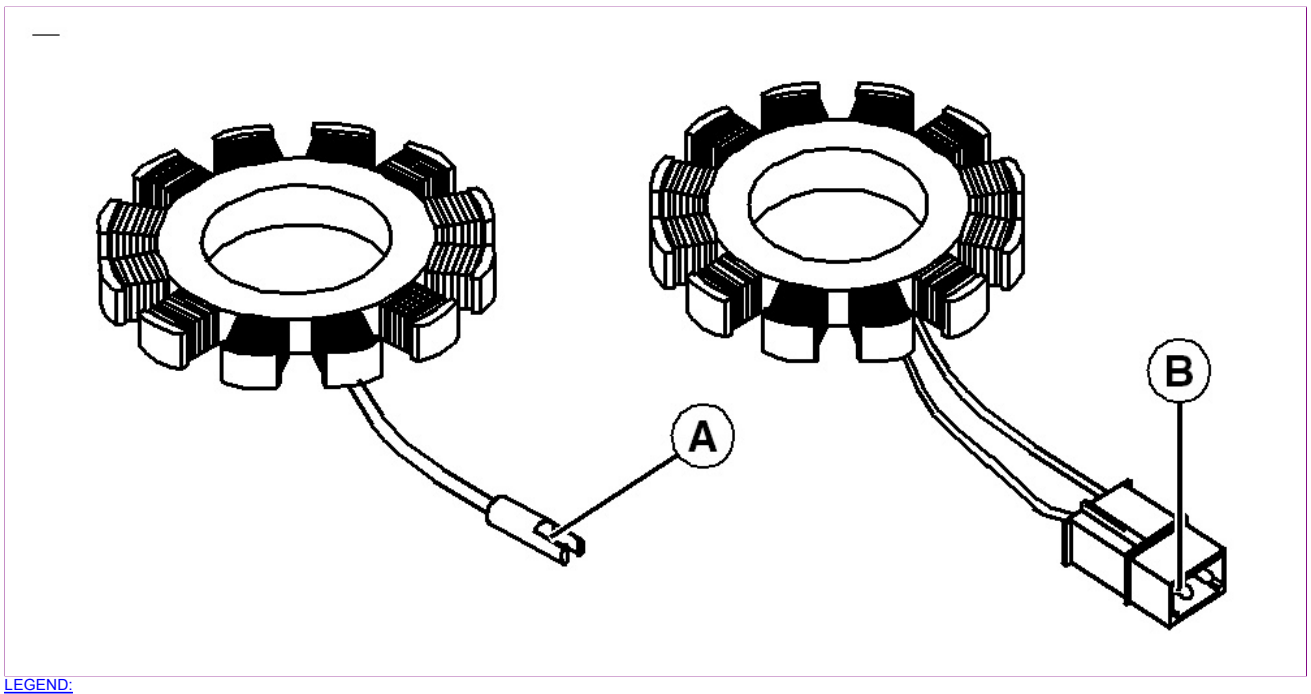
Test Procedure A

Test Conditions:

- Machine parked safely. Park brake on.
- Battery fully charged.
- Power circuits functioning properly. See appropriate power circuit section.
- Ground circuits checked and OK.
- Engine running at full throttle.
- PTO in off position.
- Stator connector unplugged.
- Voltmeter set to AC.

1 Charging System

Action:



LEGEND:

A - G2 Stator - LA105/115/125/135
B - G2 Stator - LA145/155/165/175

Is the voltage measured between stator lead(s) approximately 40 volts AC (LA105/LA115 - measured between stator lead and ground), 30 volts AC (LA145/165/175)?

Result:

YES: Go to next procedure.

NO: If below 40 volts AC (LA105/115/125/135), replace stator.

If below 30 volts AC (LA145/155/165/175), replace stator.

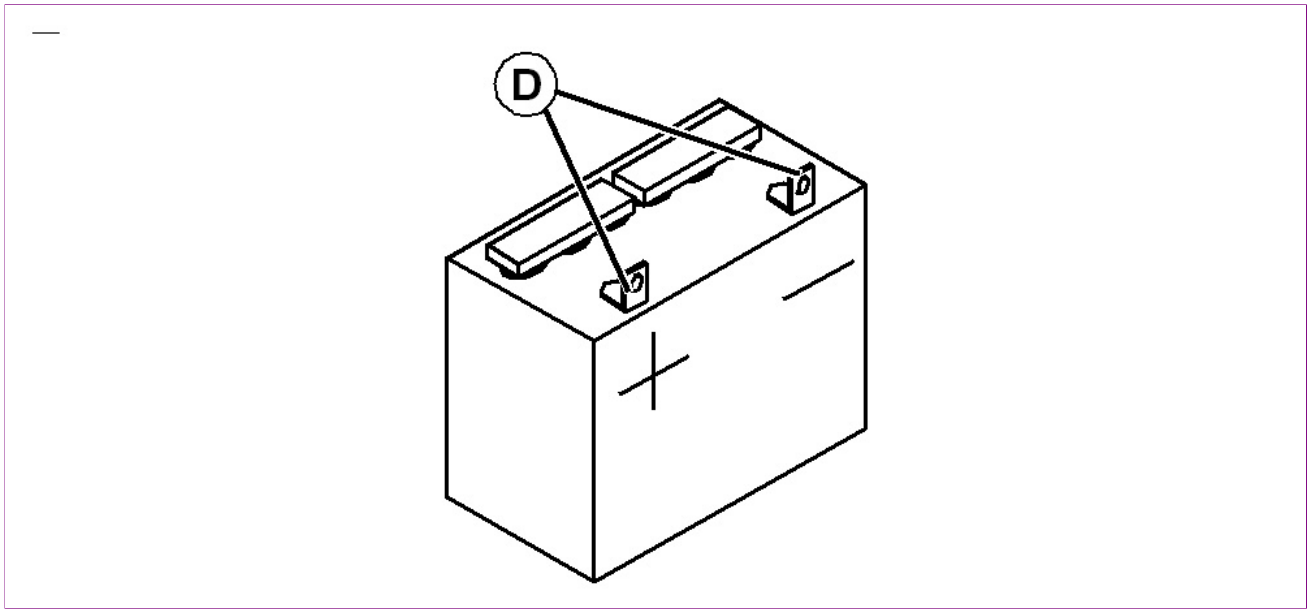
Test Procedure B

Test Conditions:

- Machine parked safely. Park brake on.
- Battery fully charged.
- Engine running full throttle.
- PTO in off position.
- Stator connected.

1 Charging System

Action:



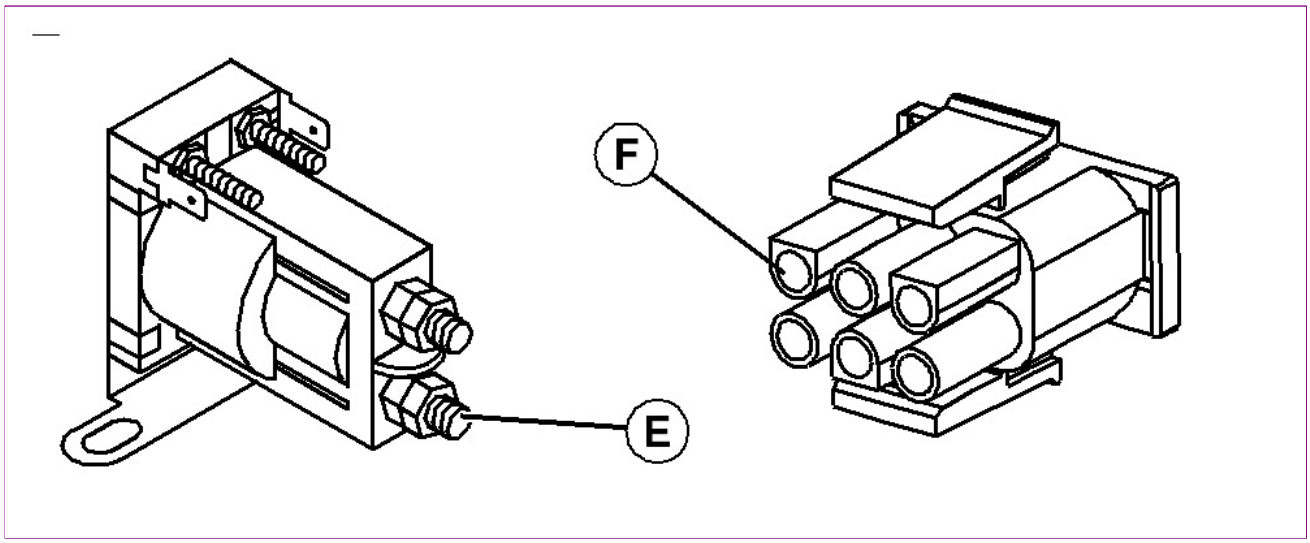
Is the voltage measured between battery terminals (D) 13.0 - 13.5 VDC?

Result:

YES: Go to next step.

NO: Check for poor connections between battery and Y1 starting motor solenoid.

Action:



Is the voltage measured at battery terminal (E) of Y1 starter solenoid 13 - 13.5 VDC?

Result:

YES: Go to next step.

NO: Check for bad connections between Y1 starting motor solenoid and X6 connector. If OK, go to next step.

Action:

Is the voltage measured at X6 connector, 220 Red wire (F), 13 - 13.5 VDC?

Result:

NO: Test voltage regulator/rectifier. See Regulated Voltage Test and other related tests.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
PTO Clutch Circuit Operation - LA145/155/165/175

PTO Clutch Circuit Operation - LA145/155/165/175

Function:

To provide a way to engage and disengage the mower drive belt.

Operating Conditions:

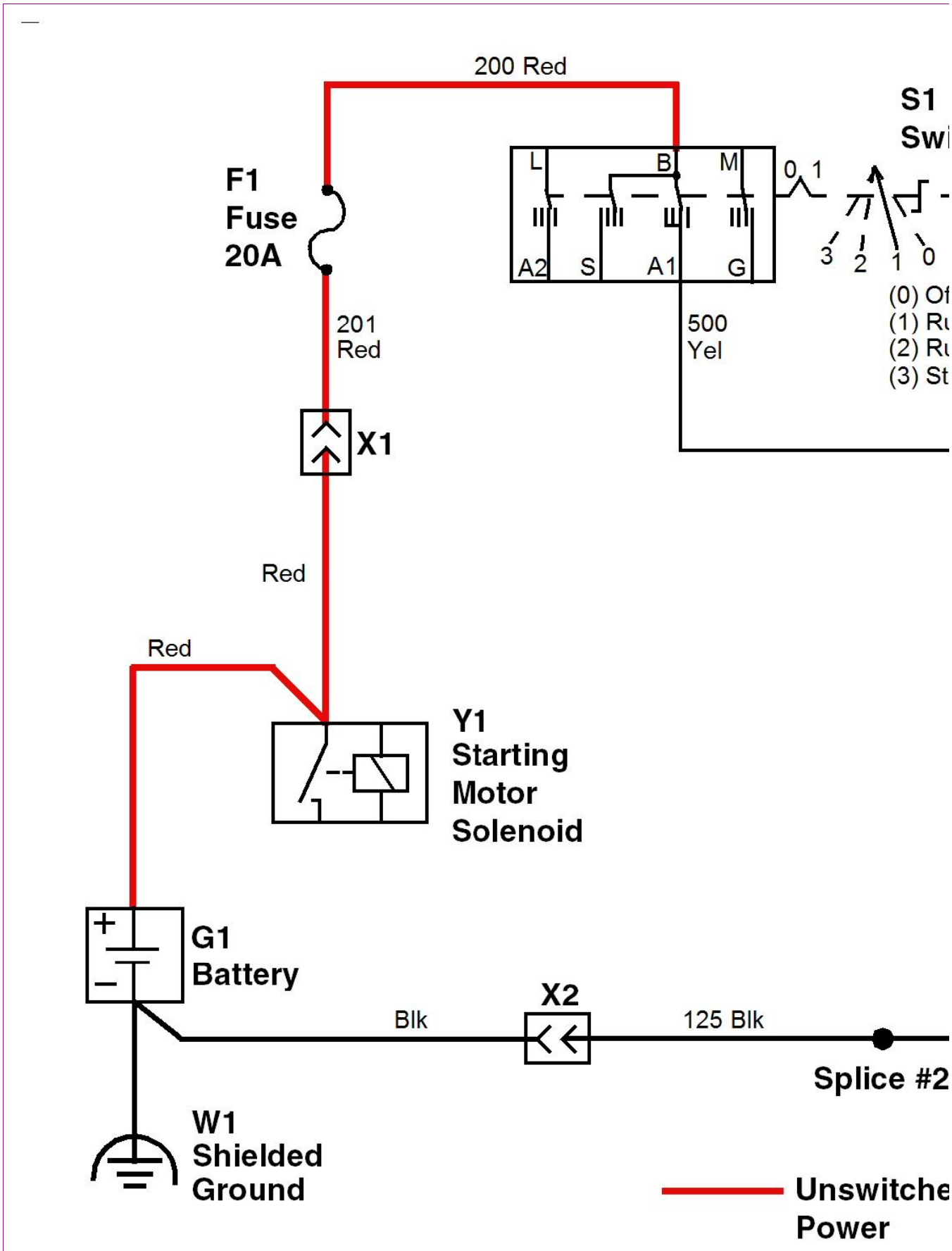
The key switch in the run position, engine running, the operator must be on the seat, brake off, and the PTO switch in the on position.

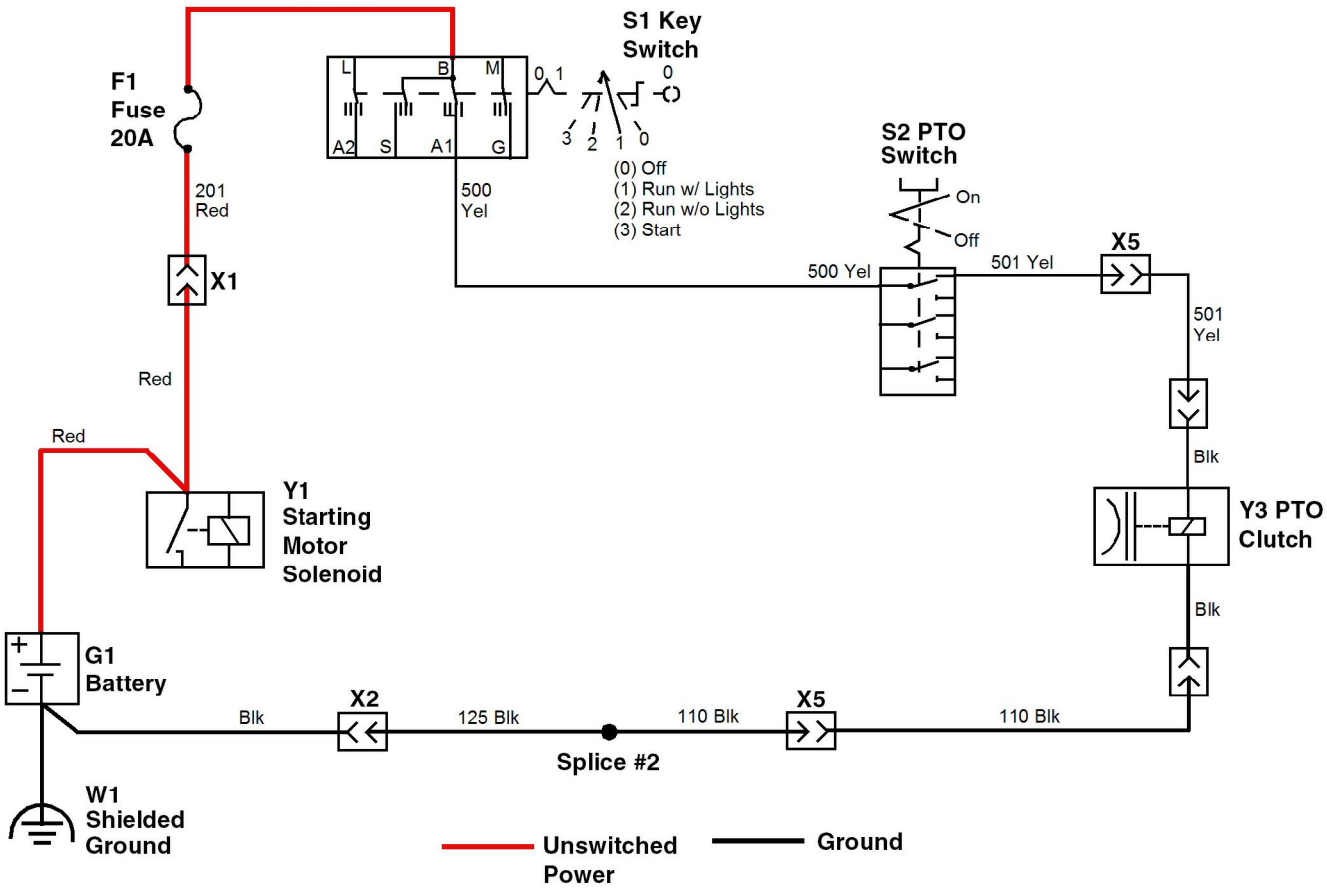
Theory of Operation:

When the PTO switch is placed in the ON position, power is supplied to the PTO clutch from the battery positive terminal by the 201 Red wire, F1 fuse, 200 Red wire, S1 key switch contacts, 500 Yel wire, S2 PTO switch contacts, 501 Yel wire to the X5 connector, and to the PTO clutch. The ground path is completed by connector X5, 110 and 125 Blk wires. As the clutch energizes, the engine crankshaft is coupled to the PTO pulley, which drives the mower deck belt. For information on PTO/RIO/RIS circuit operation, see See PTO with RIO Circuit Operation - LA145/165/175 .

20070927102110-19-200610110954

PTO Clutch Circuit Electrical Schematic - LA145/155/165/175


200 Red
S1
Swi
F1
Fuse
20A
L
B
M
0 1
A2
S
A1
G
3 2 1 0
(0) Of
(1) Ru
(2) Ru
(3) St
201
Red
500
Yel
X1
Red
Red
Y1
Starting
Motor
Solenoid
G1
Battery
X2
Blk
125 Blk
Splice #2
W1
Shielded
Ground
Unswitche
Power


S1 Key Switch
F1 Fuse 20A
L
B
M
A2
S
A1
G
0 1
3 2 1 0
0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
201 Red
500 Yel
S2 PTO Switch
On
Off
500 Yel
501 Yel
X5
501 Yel
X1
Red
Red
Blk
Y1 Starting Motor Solenoid
Y3 PTO Clutch
Blk
G1 Battery
Blk
X2
125 Blk
110 Blk
X5
110 Blk
Splice #2
W1 Shielded Ground
Unswitched Power
Ground

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
PTO Clutch Circuit Diagnosis - LA145/155/165/175

PTO Clutch Circuit Diagnosis - LA145/155/165/175

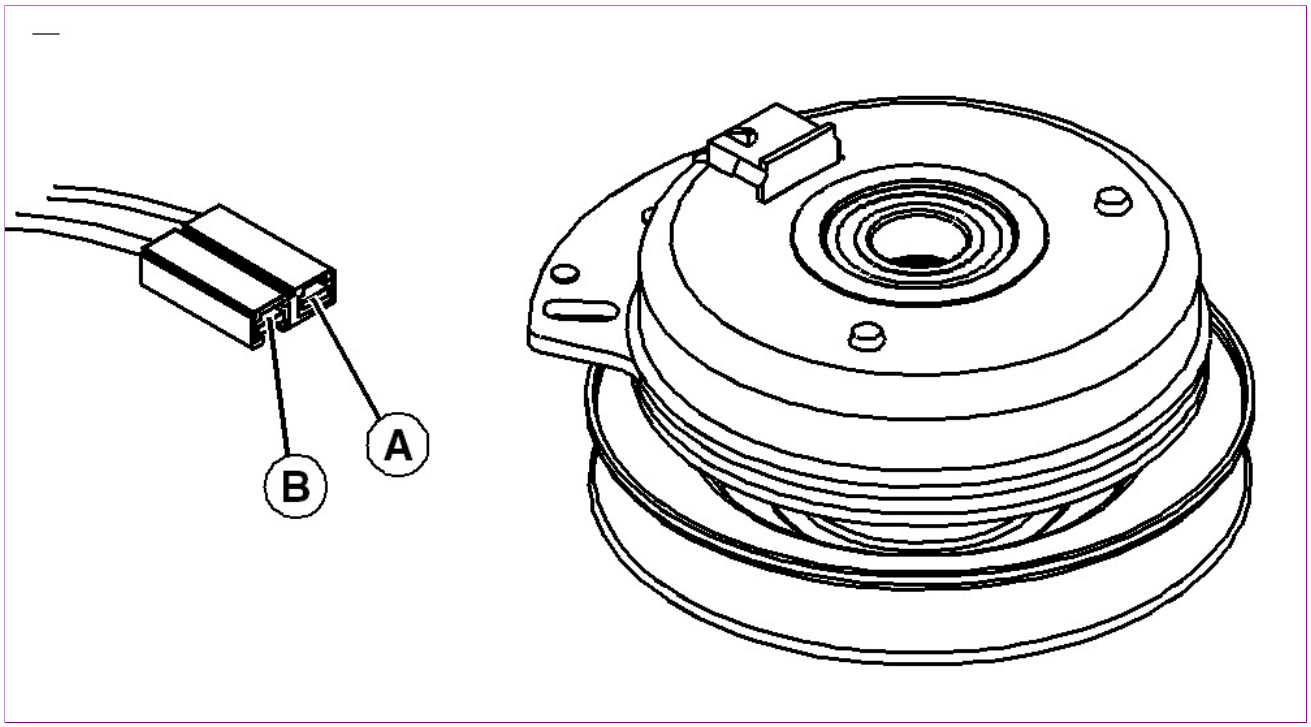
Test Procedure

Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake locked.
- Battery fully charged.
- Power circuit tests performed. See Power Circuit Diagnosis - L120/L130 - Revision D .
- Ground circuits checked and OK.
- Key switch in run position, engine off.
- PTO in on position.

1 PTO Clutch Circuit

Action:



Is battery voltage present at Y3 PTO clutch 501 Yel wire (A)?

Result:

YES: Go to next step.

NO: Check 501 Yel wire.

Action:

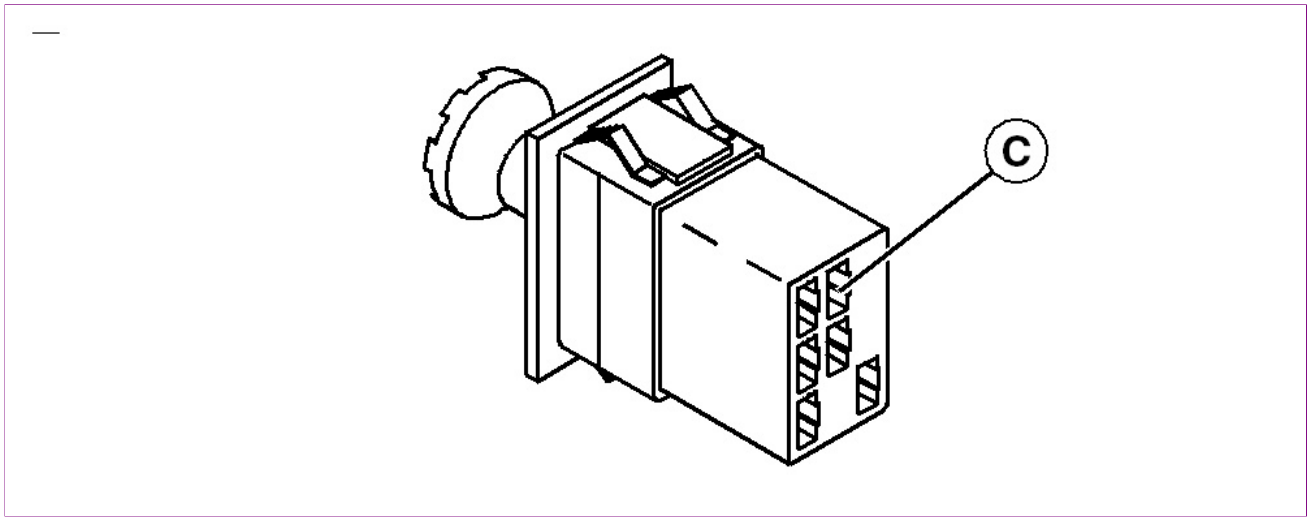
Is continuity present between Y3 PTO clutch connector 110 Blk wire (B) and ground?

Result:

YES: Go to next step.

NO: Check 110 and 125 Blk wires and connections. Check W4 negative jumper wiring harness.

Action:



Is battery voltage present at S2 PTO switch 501 Yel wire (C)?

Result:

NO: Check for battery voltage at 500 Yel wire of PTO switch. If OK, replace PTO switch.

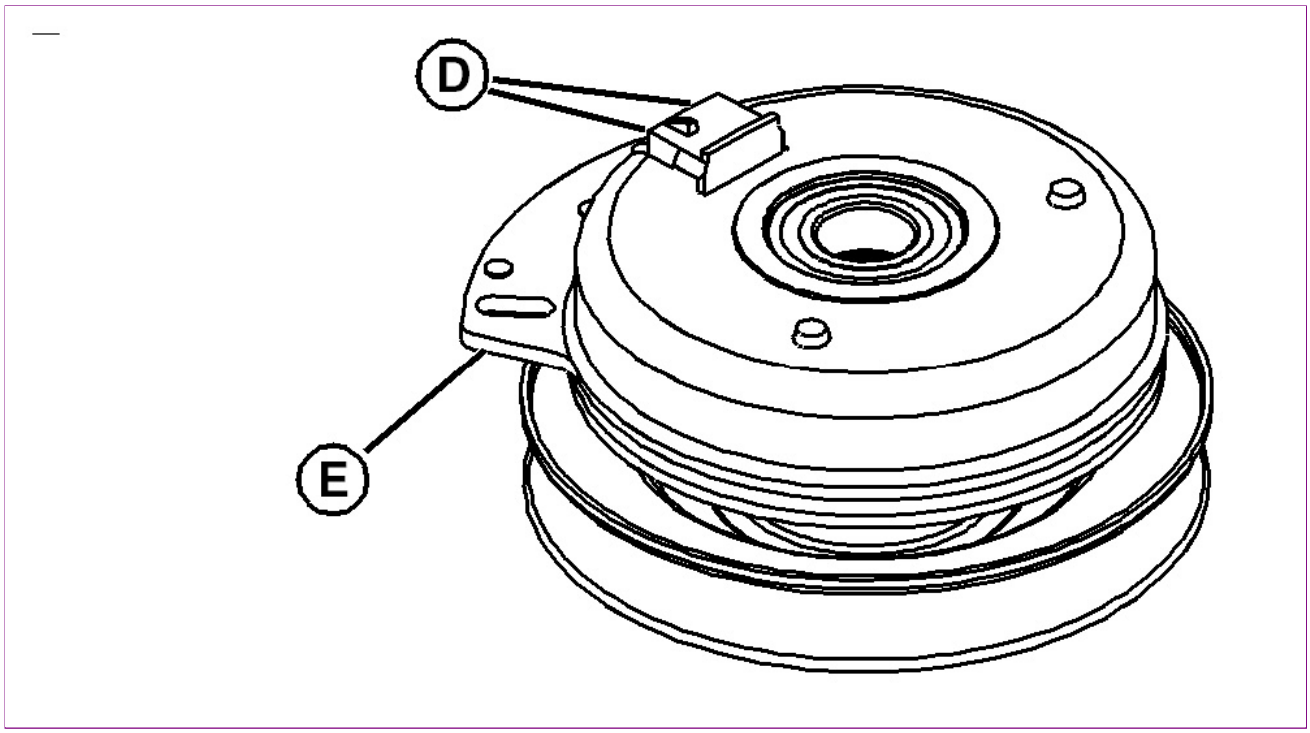
NO: Check 501 Yel wire and connections.

Test Conditions:

- Key switch off.
- PTO/RIP switch off.
- PTO clutch connector disconnected.

1 PTO Clutch Test

Action:



Is approximately 3.7 ohms resistance measured across the Y2 PTO clutch coil leads (D)?

Result:

YES: Go to next step.

NO: Replace PTO clutch.

Action:

Is infinite resistance measured from each clutch coil lead (D) to clutch body (E)?

Result:

YES: Test complete.

NO: Replace PTO clutch. Test complete.

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
PTO with RIO Circuit Operation - LA105/115/125/135

PTO with RIO Circuit Operation - LA105/115/125/135

Function:

To provide a safety interlock when the machine is being operated in reverse while the PTO is engaged, by providing a ground path to be used by either the ignition coil(s) to shutoff the engine, or the RIO latch relay to keep the engine running. An operator who deems it necessary, and chooses to keep the PTO engaged while backing up, must take a deliberate action to actuate the RIS switch, by pressing the button momentarily while pressing the reverse pedal.

RIO Operating Conditions:

The key switch must be in the run position, engine running, the operator must be on the seat, the PTO engaged, and the RIS switch must be pressed (momentary) while starting operation in reverse.

Theory of Operation:

The Reverse Implement Option (RIO) is controlled by a relay and two switches wired in a circuit with the ignition coil. This combination of components provide for control of three different functional situations:

- PTO off with any drive function.
- PTO on and operating in reverse without activating the RIO circuit.
- PTO on and operating in reverse while activating the RIO circuit.

PTO off:

When the PTO is disengaged, the machine will operate in both forward and reverse without activating any other switch(es). The PTO switch breaks (opens) the ground path interlock with the RIO circuit switches for the ignition coil, and the engine will continue to run normally.

PTO on and operating in reverse without activating the RIO circuit:

During this condition when the PTO is engaged and the machine is operated in reverse, there is a ground path created for the ignition coil through 125 and 110 Blk wires, S6 RIO switch contacts (normally open), 957 Wht wire, RIO latch relay contacts (normally closed), 949 Wht/Blk wire, PTO switch contacts (normally open), 943 and 940 Wht wires, to the ignition coil. This will ground the ignition coil and cause the engine to shut off.

PTO on and operating in reverse while activating the RIO circuit:

During this condition, when the PTO is engaged and the machine is operated in reverse, there is a ground path created for the RIO latch relay, both momentary and continuous. The momentary ground path allows the RIO latch relay to pull in, closing the contacts between the common and normally open contacts of the relay.

The momentary path is connected into the continuous power path which consists of:

Power Circuit:

Power flows to the K1 PTO latch relay over the 407 Yel wire, through the P1 hour meter, and the 401 Yel wire from the “A1” terminal of the S1 key switch.

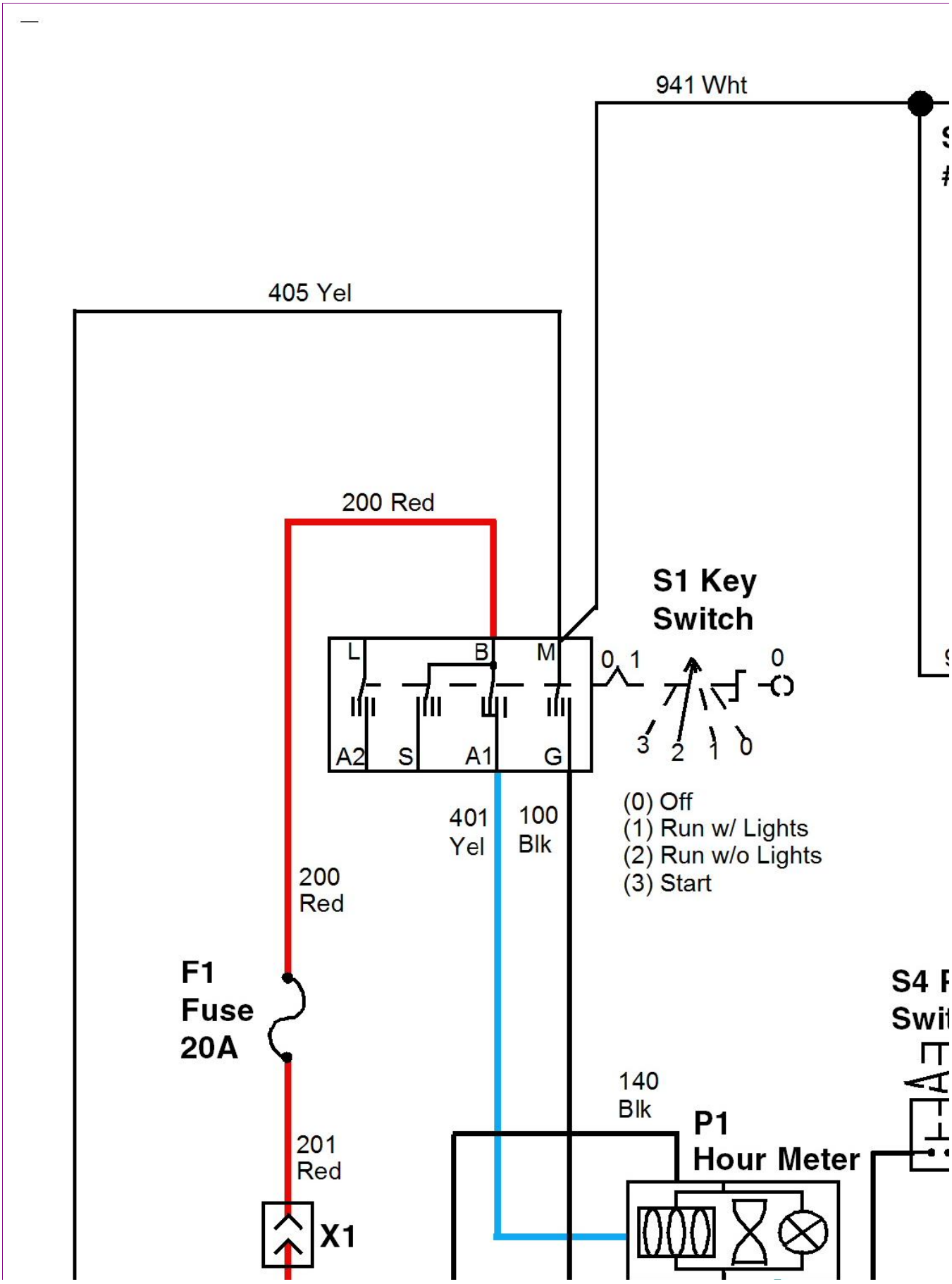
Ground Circuit:

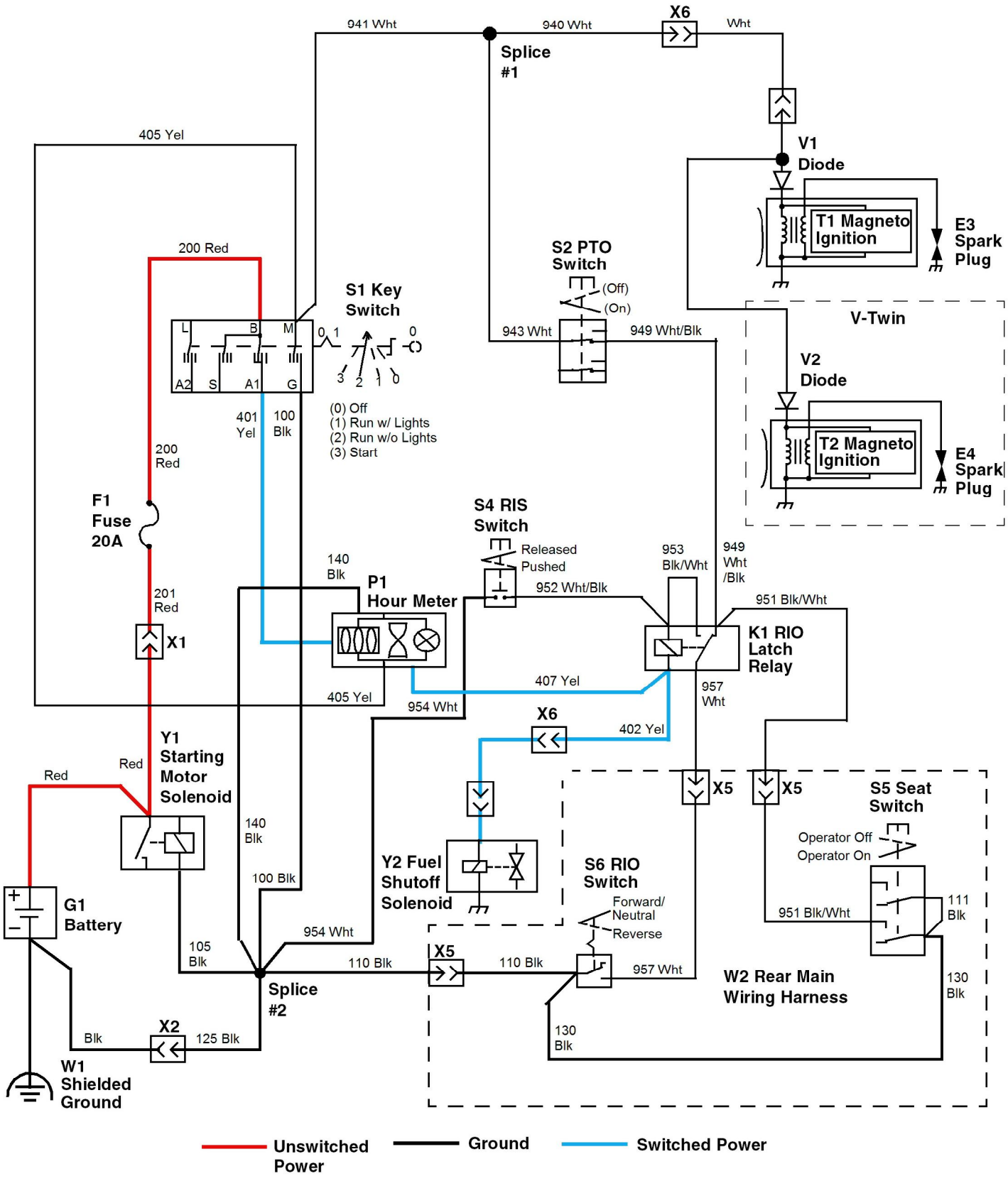
The latching ground path for the RIO latch relay consists of: 125 Blk wire, 954 Wht wire, and S4 RIO switch, which latches the relay. The relay will remain latched as long as the S6 RIO switch is in the reverse position by maintaining a ground through 953 Blk/Wht, 957 Wht, S6 RIO switch (closed in reverse), 110 and 125 Blk wires to W4 negative jumper wiring harness.

Reset Operation:

When the operator places the machine back to neutral or forward, circuit latch is released, breaking the ground path that holds the K1 RIO latch relay in the on condition. This allows the circuit to be self reset and ready for the next RIS reverse operation with the PTO engaged.

PTO with RIO Circuit Schematic - LA105/115/125/135


941 Wht
405 Yel
200 Red
S1 Key
Switch
L
B
M
A2
S
A1
G
0 1
0
3 2 1 0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
401
Yel
100
Blk
200
Red
F1
Fuse
20A
201
Red
X1
140
Blk
P1
Hour Meter


941 Wht
940 Wht
X6
Wht
Splice
#1
405 Yel
V1
Diode
T1 Magneto
Ignition
E3
Spark
Plug
200 Red
S2 PTO
Switch
(Off)
(On)
S1 Key
Switch
V-Twin
943 Wht
949 Wht/Blk
L
B
M
A2
S
A1
G
0 1
3 2 1 0
V2
Diode
T2 Magneto
Ignition
E4
Spark
Plug
401
Yel
100
Blk
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
200
Red
F1
Fuse
20A
S4 RIS
Switch
Released
Pushed
140
Blk
P1
Hour Meter
952 Wht/Blk
953
Blk/Wht
949
Wht
/Blk
951 Blk/Wht
201
Red
X1
K1 RIO
Latch
Relay
407 Yel
405 Yel
954 Wht
957
Wht
X6
402 Yel
Y1
Starting
Motor
Solenoid
Red
Red
X5
X5
S5 Seat
Switch
Operator Off
Operator On
140
Blk
Y2 Fuel
Shutoff
Solenoid
S6 RIO
Switch
Forward/
Neutral
Reverse
100 Blk
951 Blk/Wht
111
Blk
G1
Battery
954 Wht
105
Blk
X5
110 Blk
110 Blk
957 Wht
W2 Rear Main
Wiring Harness
130
Blk
Splice
#2
130
Blk
Blk
X2
125 Blk
W1
Shielded
Ground
Unswitched
Power
Ground
Switched Power

PTO with RIO Circuit Diagnosis - LA105/115/125/135

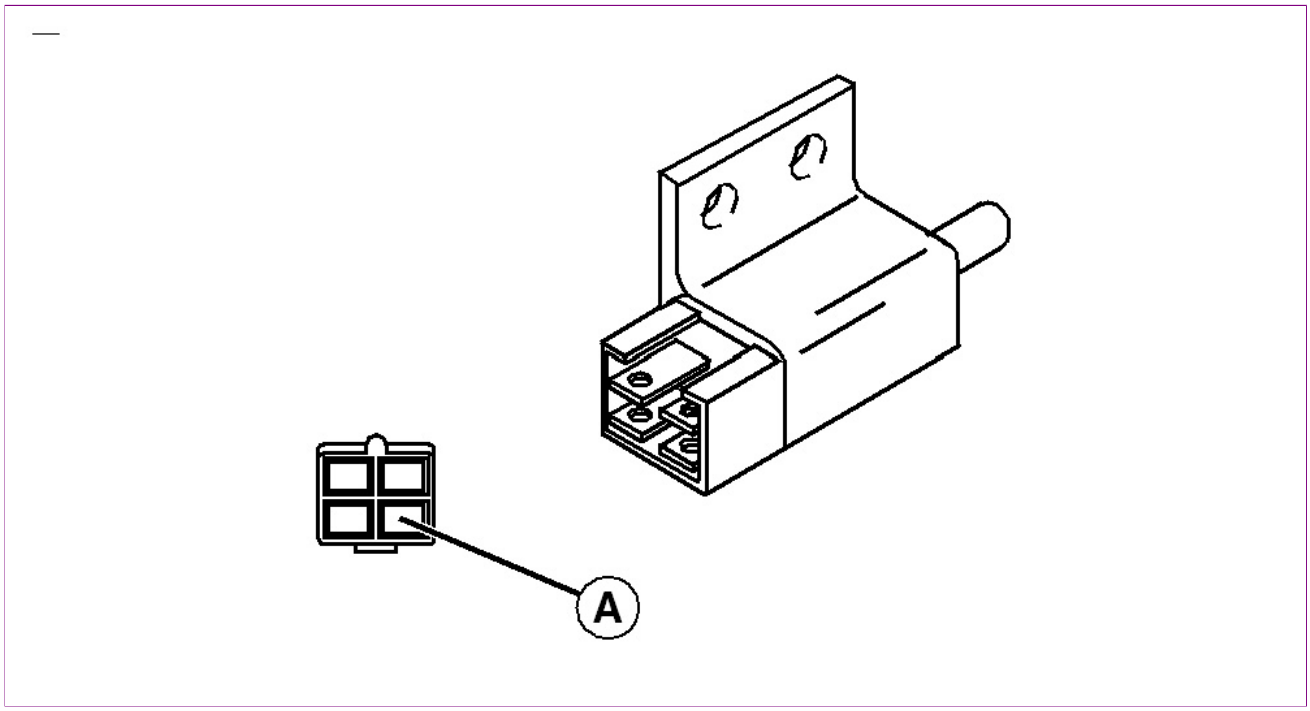
Test Procedure A

Test Conditions:

- Park machine safely. Park brake on.
- Battery fully charged.
- Key Switch in run position, engine not running.
- PTO in on position.
- Operator off seat.

1 PTO with RIO Circuit Diagnosis

Action:



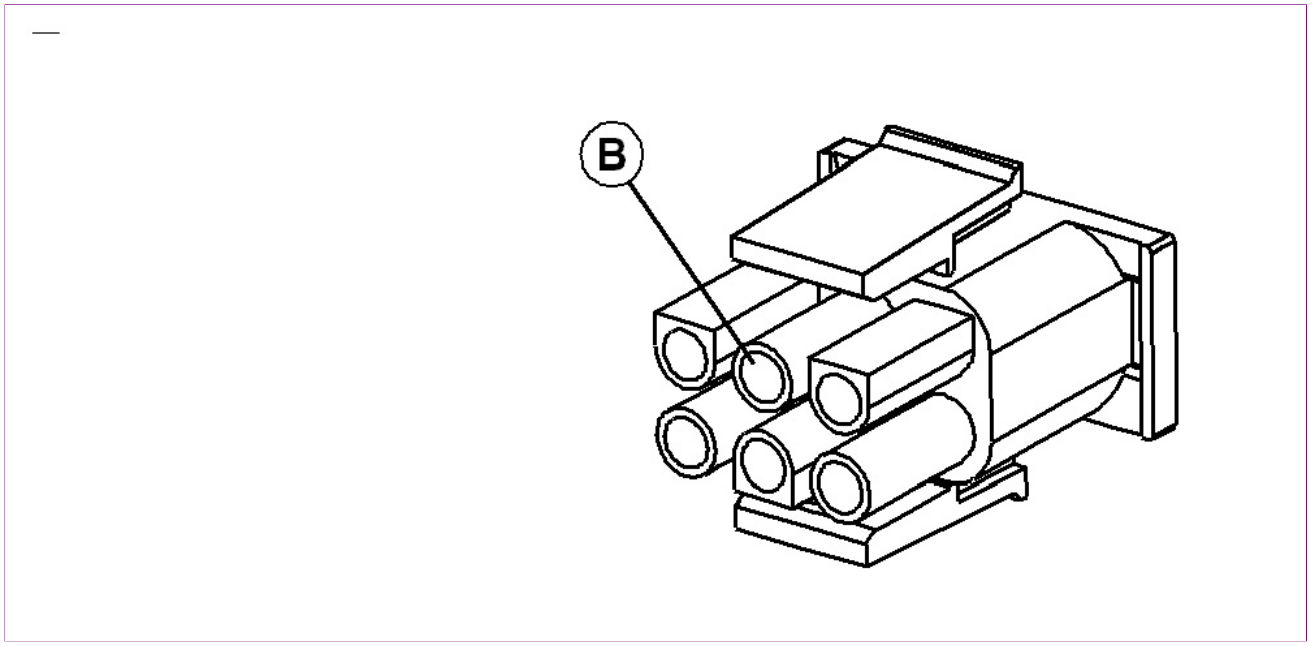
Disconnect S2 PTO switch. Is continuity to ground present between S2 PTO switch 949 Wht/Blk wire (A) and ground?

Result:

YES: Go to next step.

NO: Check 949 Wht/Blk, 951 Blk/Wht, 130, 110, 125 Blk wires, and connections. If OK, go to next step.

Action:



Is continuity to present between connector X6 940 Wht wire (B) and ground?

Result:

YES: See .

NO: Check 943 and 940 Wht wires and connections. If OK, see See Test Procedure B .

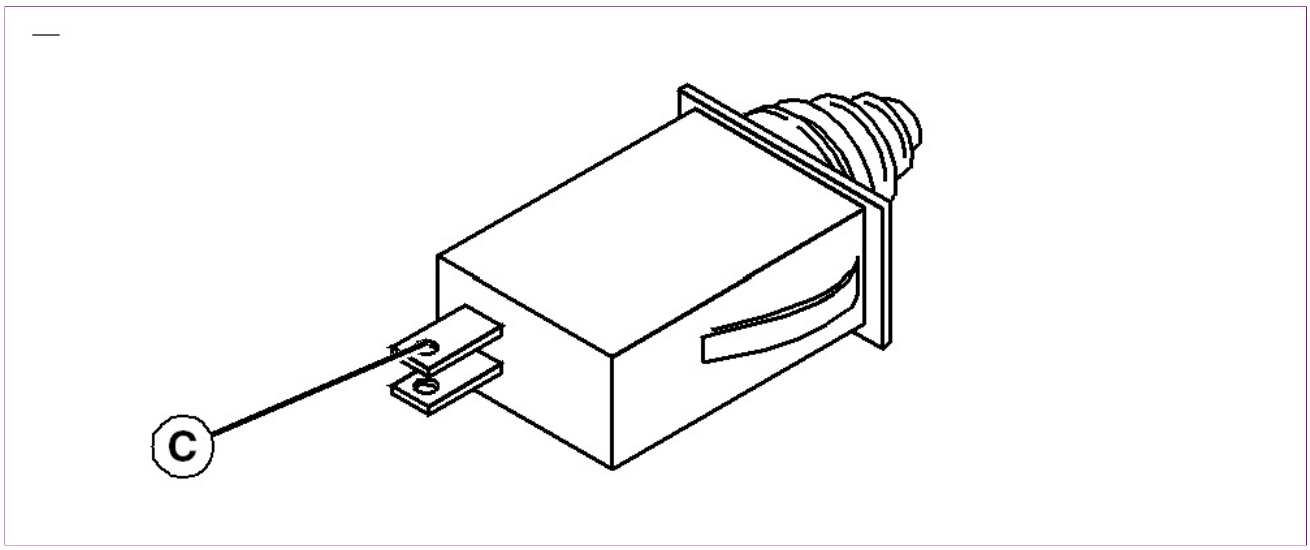
Test Procedure B

Test Conditions:

- Park machine safely. Park brake on.
- Key Switch in off position.
- Battery fully charged.
- Transmission in reverse.
- PTO in on position.
- Operator on seat.
- RIS switch in pressed position during test.

1 PTO with RIO Circuit Diagnosis

Action:



Is continuity present between S6 RIO switch 957 Wht wire (C) and ground?

Result:

YES: Go to next step.

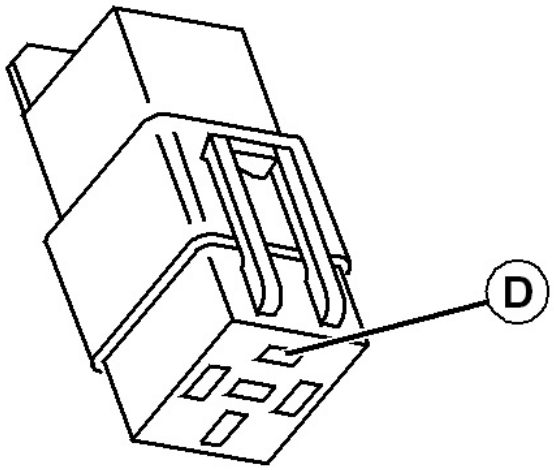
NO: Check 110 and 125 Blk wires and connections.

NO: Check 953 Blk/Wht, 952 Wht/Blk, 954 and 957 Wht, 110 and 125 Blk wires, and connections.

NO: Test RIO switch. See RIO Switch Test .

Action:

—



At K1 RIO latch relay, is continuity present between 953 Blk/Wht wire (D) and ground?

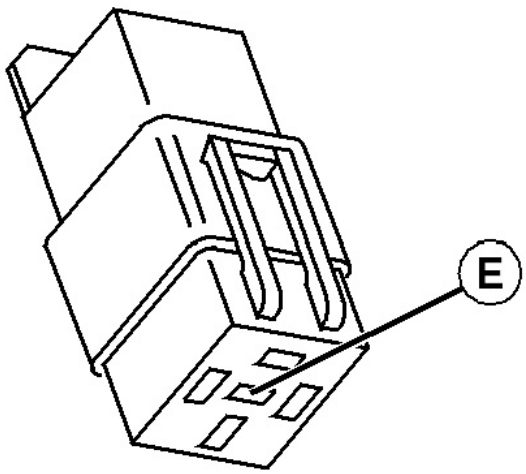
Result:

YES: Go to next step.

NO: Check 952 Wht/Blk wire and connections.

Action:

—



At K1 RIO latch relay, is continuity present between 949 and 951 Wht/Blk wires (E) and ground?

Result:

YES: See “Test Procedure C” below.

NO: Test RIO latch relay. If OK, See Test Procedure C .

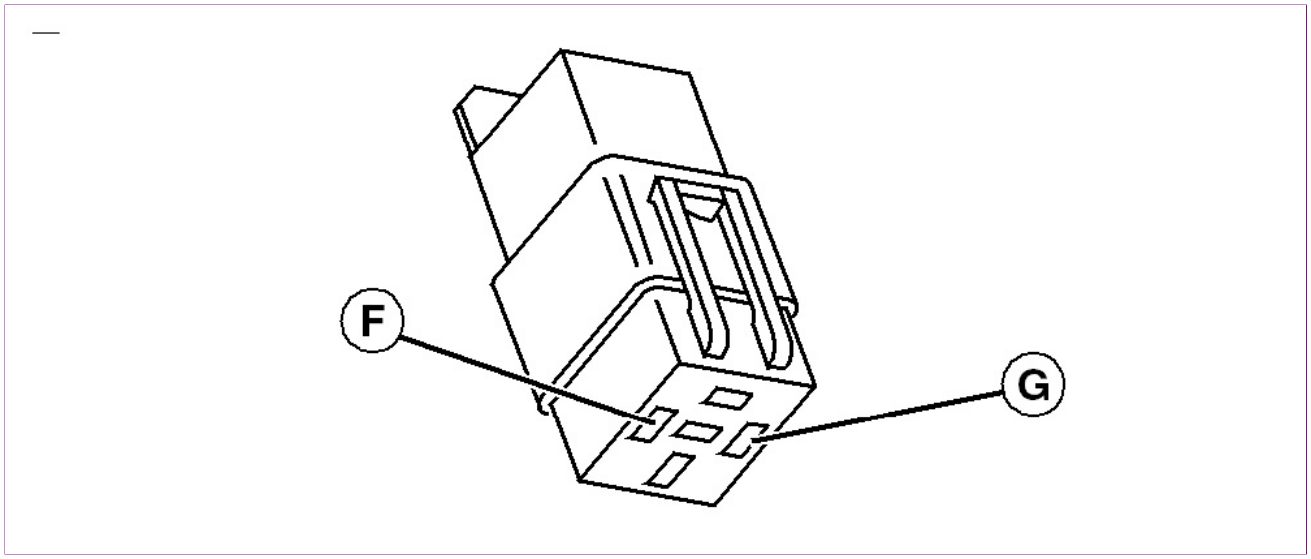
Test Procedure C

Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake on.
- Key Switch in RUN position, engine not running.
- Transmission in reverse.
- PTO in on position.
- Operator on seat.
- RIS switch in pressed momentarily to latch relay.

1 PTO with RIO Circuit Diagnosis

Action:



Is battery voltage present at K1 RIO latch relay 410 (401 Revision E) Yel wire (F)?

Result:

YES: Go to next step.

NO: See Power Circuit Diagnosis - 102/115/125/135 .

Action:

Is continuity present between K1 RIO latch relay 953 Blk/Wht wire (G) and ground?

Result:

NO: Check 954 and 957 Wht wires and connections.

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
PTO with RIO Circuit Operation - LA145/155/165/175

PTO with RIO Circuit Operation - LA145/155/165/175

Function:

To provide a safety interlock when the machine is being operated in reverse while the PTO is engaged, by providing a ground path to be used by either the ignition coil to shutoff the engine, or the RIO latch relay to keep the engine running. An operator who deems it necessary, and chooses to keep the PTO engaged while backing up, must take a deliberate action to actuate the RIS switch, by pressing the button momentarily while pressing the reverse pedal.

RIO Operating Conditions:

The key switch must be in the run position, engine running, the operator must be on the seat, the PTO engaged, and the RIS switch must be pressed (momentary) while starting operation in reverse.

Theory of Operation:

The Reverse Implement Option (RIO) is controlled by a relay and two switches wired in a circuit with the ignition coil. This combination of components provide for control of three different functional situations:

- PTO off with any drive function.
- PTO on and operating in reverse without activating the RIO circuit.
- PTO on and operating in reverse while activating the RIO circuit.

PTO Off:

When the PTO is disengaged, the machine will operate in both forward and reverse without activating any other switch(es). The PTO switch breaks (opens) the ground path interlock with the RIO circuit switches for the ignition coil and the engine will continue to run normally.

PTO on and operating in reverse without activating the RIO circuit:

During this condition when the PTO is engaged and the machine is operated in reverse, there is a ground path created for the ignition coil(s) through 125, 110 Blk wires, S6 RIO switch contacts (normally open), 957 Wht wire, RIO latch relay contacts (normally closed), 949 Wht/Blk wire, PTO switch contacts (normally open), 943 and 940 Wht wires, to the ignition coil. This will ground the ignition coil(s) and cause the engine to shut off.

PTO ON and operating in reverse while activating the RIO circuit:

During this condition, when the PTO is engaged and the machine is operated in reverse, there is a ground path created for the RIO latch relay, both momentary and continuous. The momentary ground path allows the RIO latch relay to pull in, closing the contacts between the common and normally open contacts of the relay.

Power Circuit:

Power flows from the G1 battery over the positive battery cable to the Y1 starter solenoid positive terminal. It is the carried by

the 201 Red wire, F1 fuse, and 200 Red wire to the “B” terminal of the S1 key switch. Power exits the switch (in RUN position) at the “A1” terminal over the 500 Yel wire and splices into the 401 Yel wire at the S2 PTO switch. The 401 Yel wire then connects to the X3 power port and splices to the 410 Yel wire which carries power to the K1 RIO latch relay.

Ground Circuit:

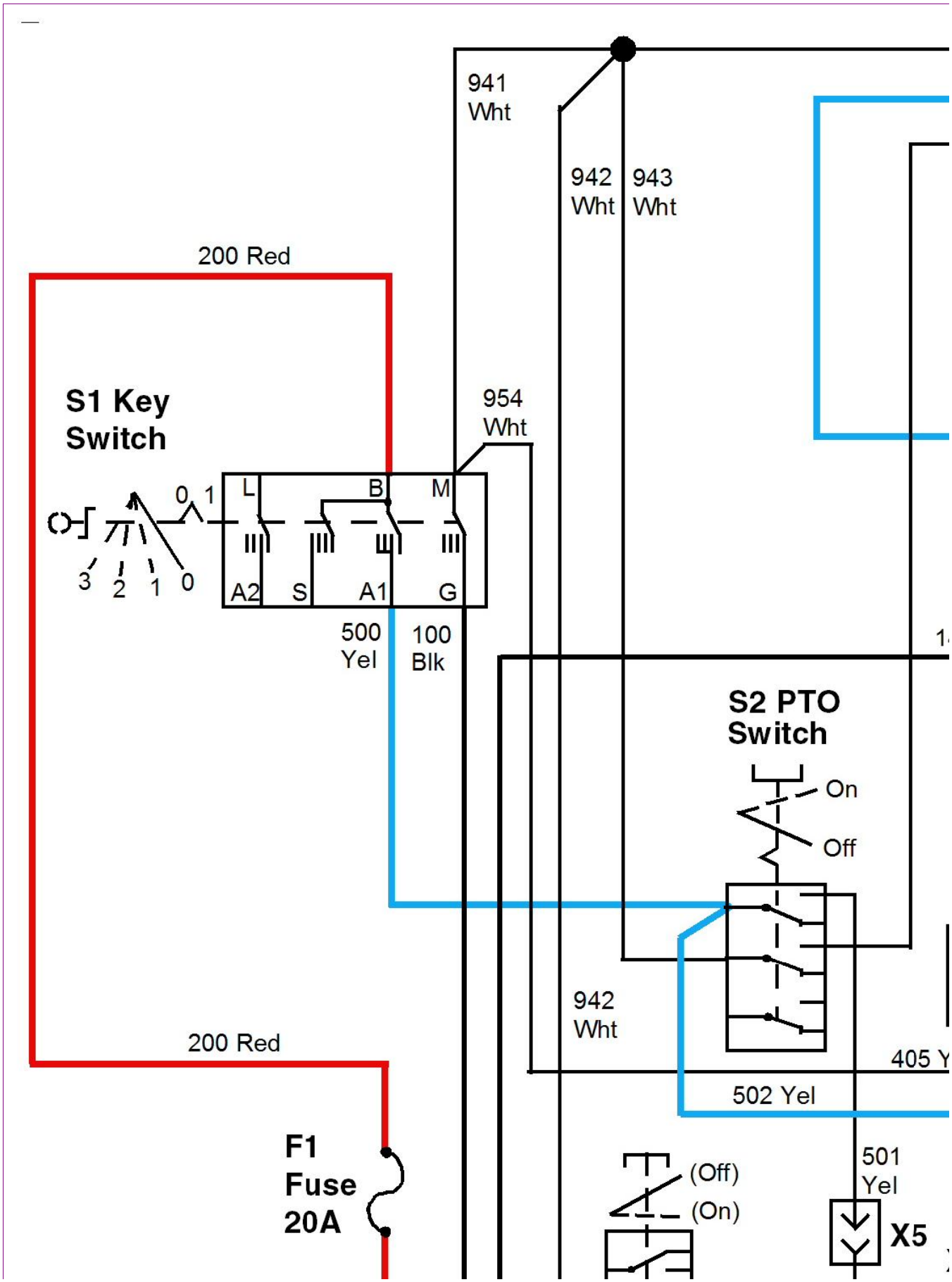
The momentary path is connected to the continuous path when the RIS is pressed and closes it’s contacts to connect 954 Wht wire to the W4 negative wiring harness to ground. This energizes the K1 latch relay coil.

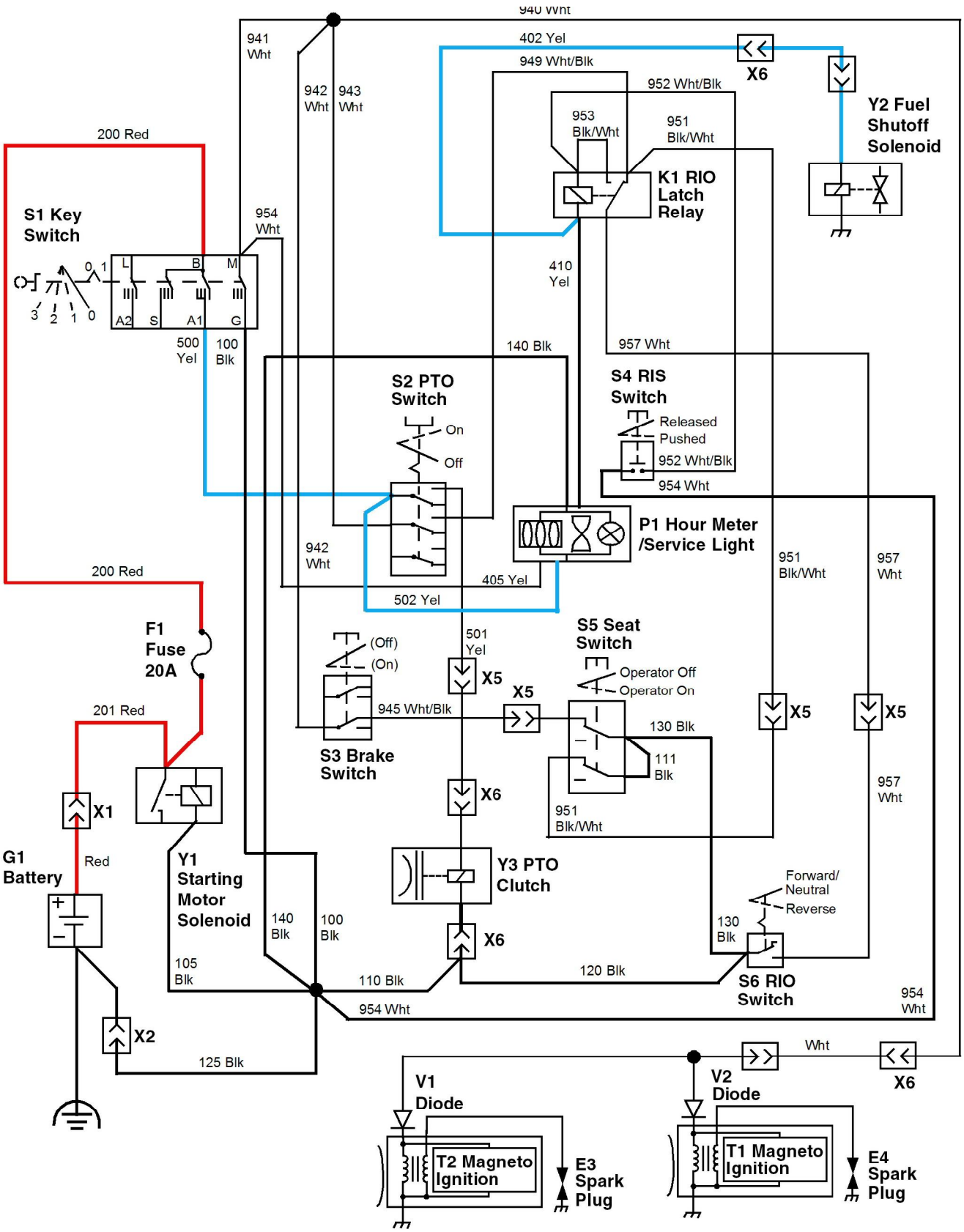
Once the K1 RIO latch relay is energized and the S4 RIS switch is released, a continuous ground path is maintained through 110 and 120 Blk wires, S6 RIO switch (closed in reverse), 947 Wht wire, and 953 Blk/Wht wire to the K1 RIO latch relay coil.

Reset Operation:

When the operator places the machine back to neutral or forward, the S2 RIO switch is released, breaking the ground path that holds the K1 RIO latch relay in the ON condition. This allows the circuit to be self reset and ready for the next RIS reverse operation with PTO engaged. For information on PTO clutch operation, see See PTO Clutch Circuit Operation - L120/L130 .

PTO with RIO Circuit Schematic - LA145/155/165/175


941
Wht
942
Wht
943
Wht
200 Red
S1 Key
Switch
954
Wht
0 1
L
B
M
3 2 1 0
A2
S
A1
G
500
Yel
100
Blk
S2 PTO
Switch
On
Off
942
Wht
200 Red
405 Y
502 Yel
F1
Fuse
20A
(Off)
(On)
501
Yel
X5


940 Wht
941 Wht
942 Wht
943 Wht
402 Yel
949 Wht/Blk
952 Wht/Blk
953 Blk/Wht
951 Blk/Wht
X6
Y2 Fuel Shutoff Solenoid
200 Red
S1 Key Switch
954 Wht
K1 RIO Latch Relay
410 Yel
140 Blk
957 Wht
S2 PTO Switch
On
Off
S4 RIS Switch
Released
Pushed
952 Wht/Blk
954 Wht
P1 Hour Meter /Service Light
500 Yel
100 Blk
942 Wht
405 Yel
502 Yel
951 Blk/Wht
957 Wht
200 Red
F1 Fuse 20A
501 Yel
X5
S5 Seat Switch
Operator Off
Operator On
(Off)
(On)
945 Wht/Blk
130 Blk
111 Blk
S3 Brake Switch
201 Red
X1
X6
951 Blk/Wht
957 Wht
G1 Battery
Red
Y1 Starting Motor Solenoid
Y3 PTO Clutch
Forward/ Neutral
Reverse
130 Blk
140 Blk
100 Blk
105 Blk
110 Blk
120 Blk
S6 RIO Switch
954 Wht
X2
125 Blk
Wht
V1 Diode
V2 Diode
T2 Magneto Ignition
T1 Magneto Ignition
E3 Spark Plug
E4 Spark Plug

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
PTO with RIO Circuit Diagnosis - LA145/155/165/175

PTO with RIO Circuit Diagnosis - LA145/155/165/175

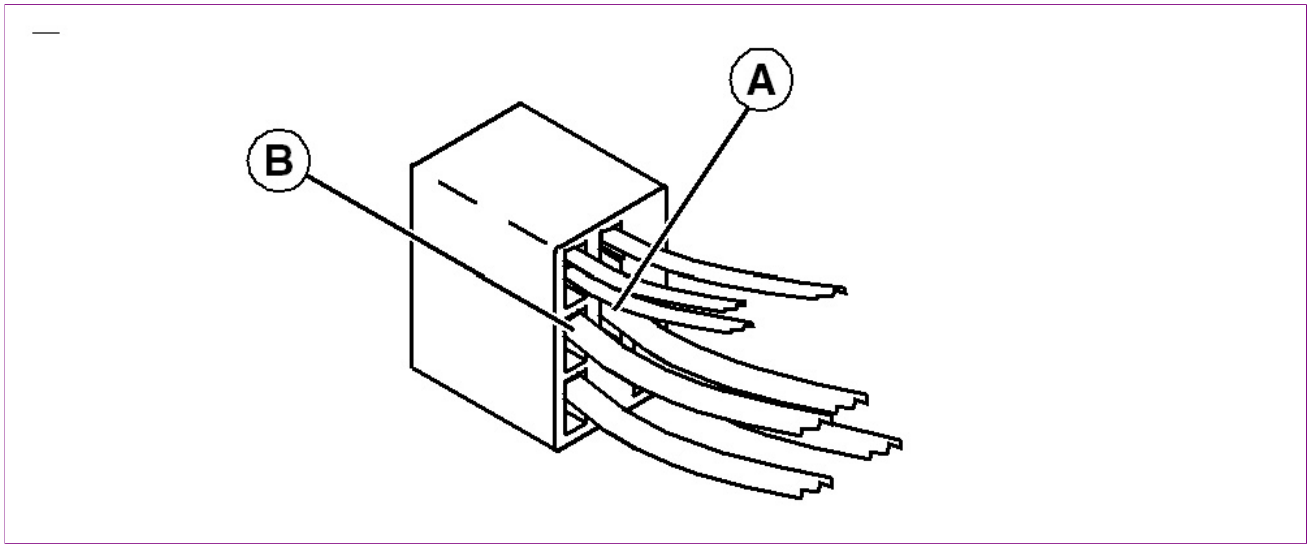
Test Procedure A

Test Conditions:

- Park machine safely. Park brake on.
- Battery fully charged.
- Ground circuits checked and OK>
- Key Switch in run position engine not running.
- Operator off seat.
- PTO in on position.

1 PTO with RIO Circuit

Action:



Disconnect S2 PTO switch. Is continuity present between S2 PTO switch 949 Blk/Wht wire (A) and ground?

Result:

YES: Go to next step.

NO: Check 949 Wht/Blk, 951 Blk/Wht, S5 seat switch (See Seat Switch Test), 111, 130, 120, 110, 125 Blk wires, and connections.

Action:

At S2 PTO switch, is continuity present between 943 Wht wire and ground?

Result:

YES: Check 943 and 940 Wht wires and connections. If OK, See Test Procedure B .

NO: See PTO Switch Test - L130 .

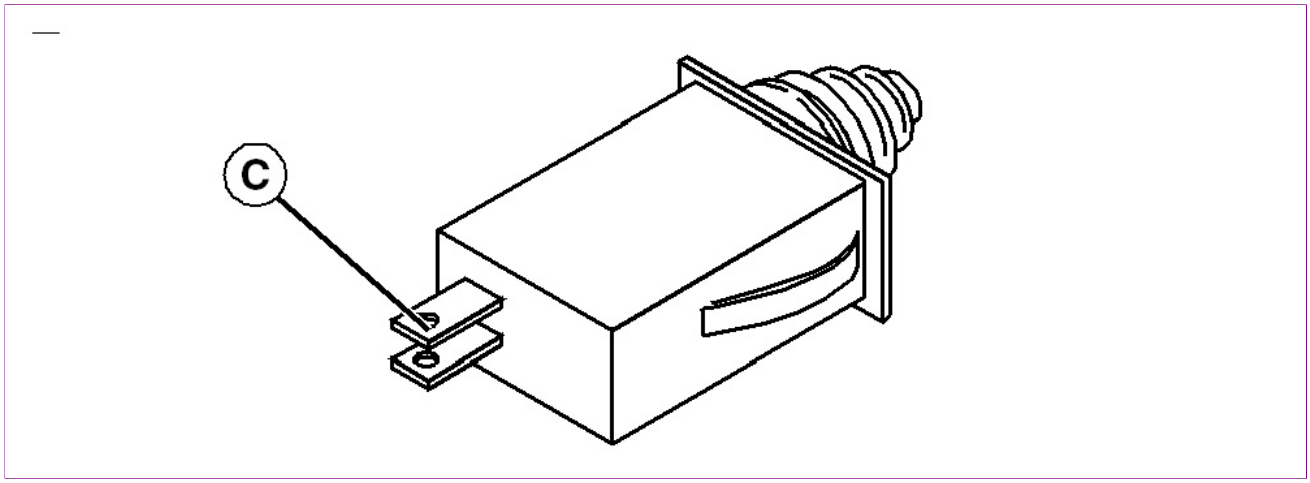
Test Procedure B

Test Conditions:

- Park machine safely. Park brake on.
- Battery fully charged.
- Ground circuits checked and OK.
- Key Switch in off position.
- Transmission in reverse.
- PTO in on position.
- Operator on seat.
- RIS switch in pressed position during test.

1 PTO with RIO Circuit

Action:



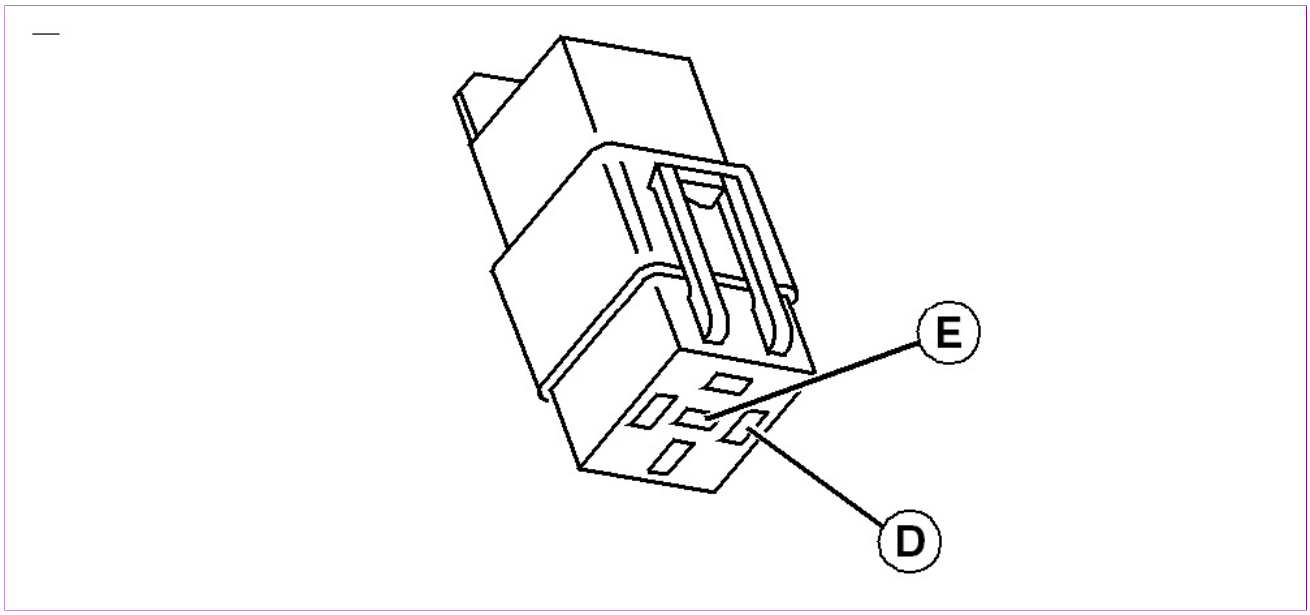
At S6 RIO switch, is continuity present between 957 Wht wire (C) and ground?

Result:

YES: Go to next step.

NO: Check 120, 110, 125 Blk wires and connections.

Action:



At K1 RIO latch relay 953 Blk/Wht wire (D), is continuity present to ground?

Result:

YES: Go to next step.

NO: Ensure that RIO switch is pressed and check for continuity to 954 Wht wire at K1 RIO latch relay. If OK, see See RIS Switch Test .

NO: Check 953 Blk/Wht, 954 and 957 Wht, 120, 110 and 125 Blk wires, and connections. If OK, go to next step.

Action:

At K1 RIO latch relay, is continuity present between 949 Wht/Blk wire (E) and ground?

Result:

YES: See Test Procedure C .

NO: Test RIO latch relay. See Relay Test .

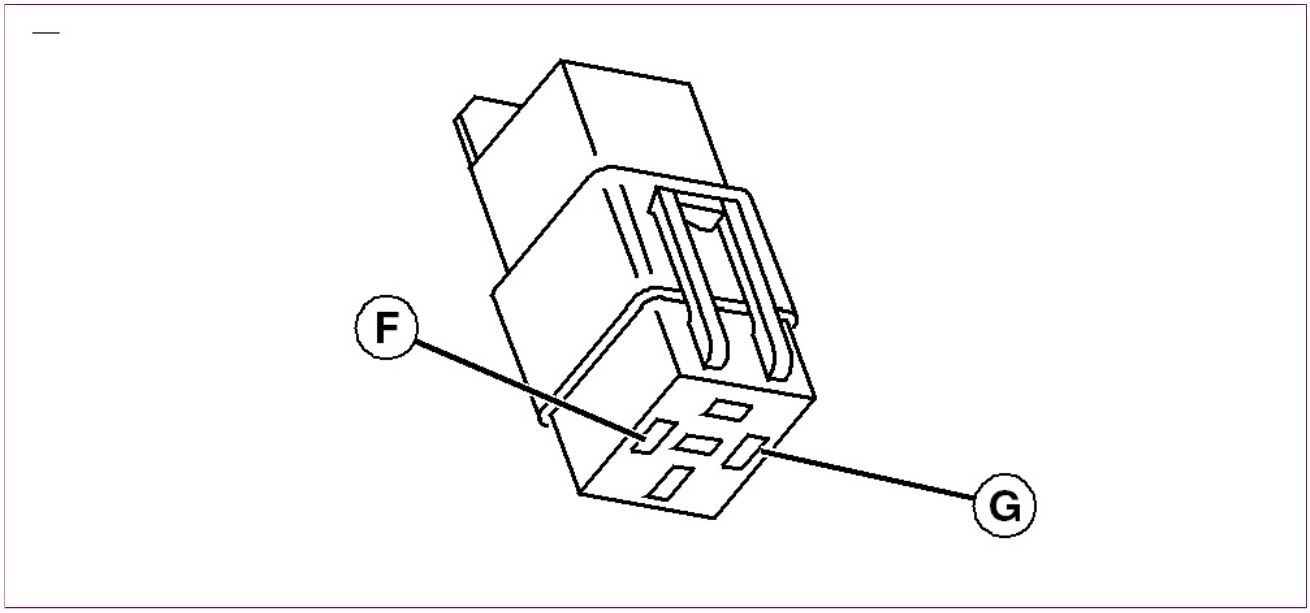
Test Procedure C

Test Conditions:

- Park machine safely. Park brake on.
- Battery fully charged.
- Key Switch in run position, engine not running.
- Transmission in reverse.
- PTO in on position.
- Operator on seat.
- RIS switch in pressed position momentarily to latch relay.

1 PTO with RIO Circuit

Action:



Is battery voltage present at K1 RIO latch relay 410 Yel wire (F)?

Result:

YES: Go to next step.

NO: See Power Circuit Diagnosis - L120/L130 . If OK, go to next step.

Action:

At K1 RIO latch relay, is continuity present between 953 Blk/Wht wire (G) and ground?

Result:

NO: Check 952 Wht/Blk wire, RIS switch (See RIS Switch Test), 954 Wht, 140, 100 and 105 Blk wires and connections.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Headlight Circuit Operation - All Models

Headlight Circuit Operation - All Models

Function:

Provides power to the headlights.

Operating Conditions:

- Key switch in the run with lights on position.

Theory of Operation:

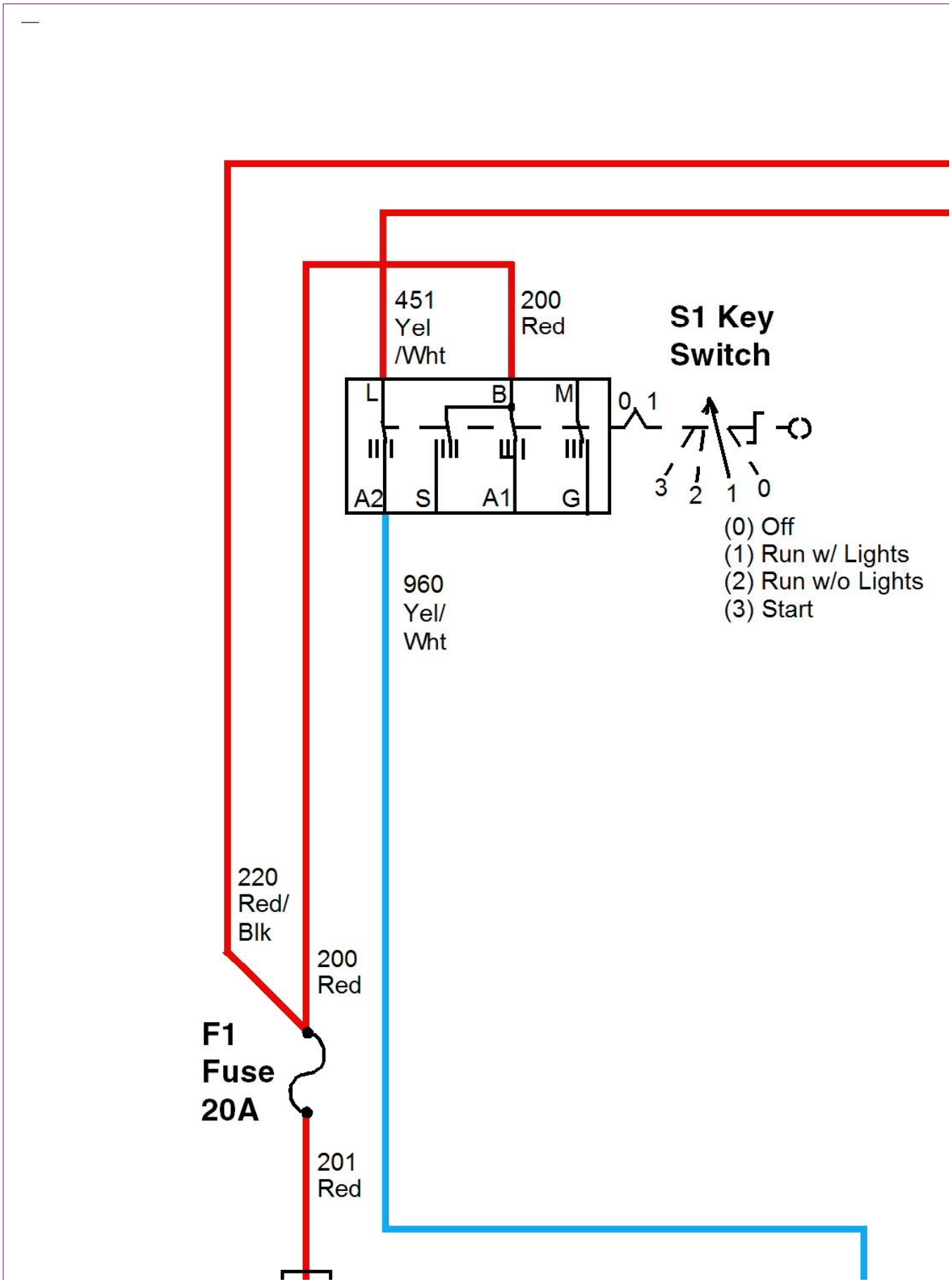
The headlights will operate any time a charged battery is correctly installed and the key switch is in the lights on position, with or without the engine running.

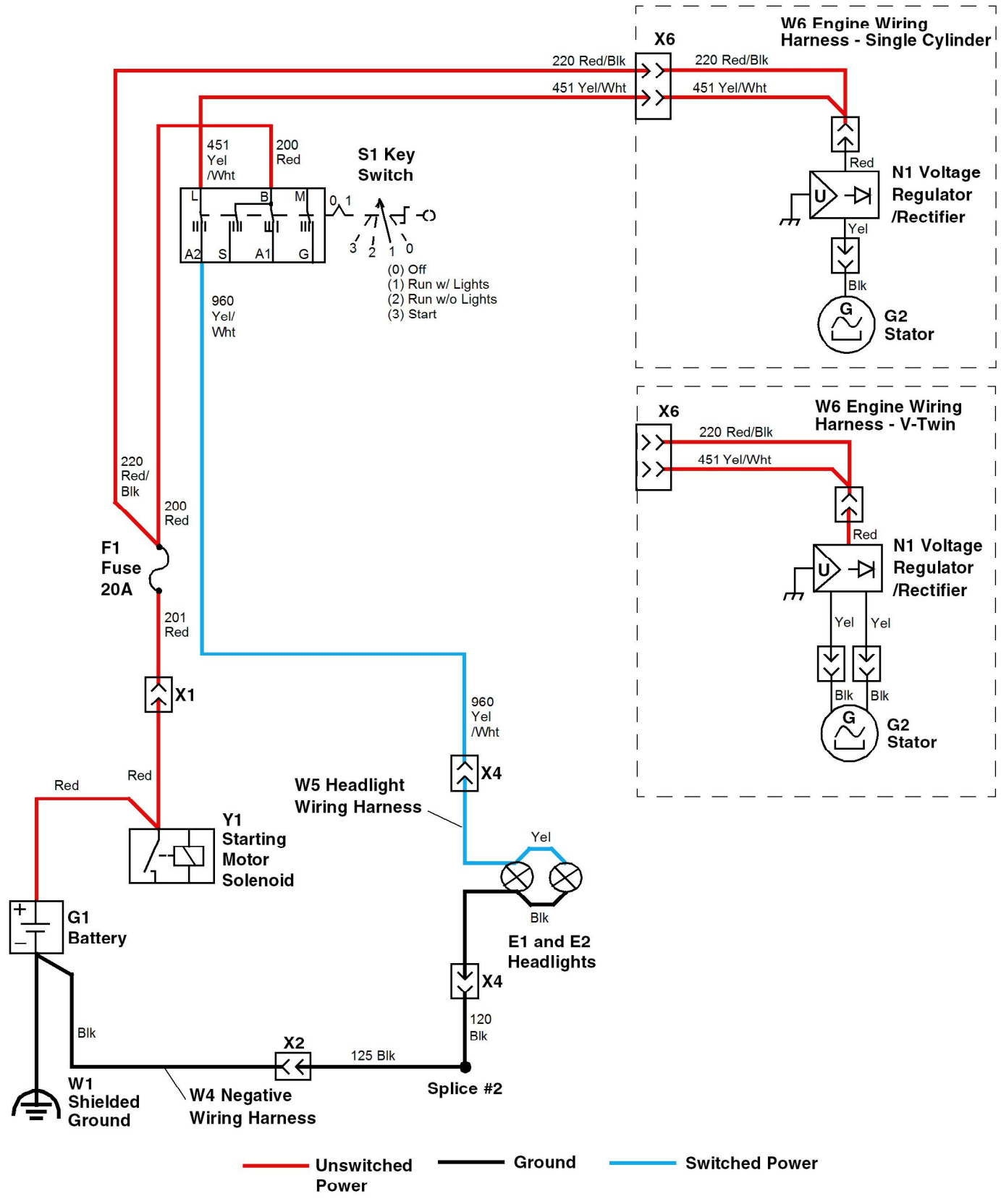
Power is supplied for the headlight circuit from the Y1 starting motor solenoid terminal, F1 fuse, 220 Red/Blk wire, X6 connector, splice at regulator/rectifier connector, and through X6 connector again. The 451 Yel/Wht wire carries power to the “L” terminal of the S1 key switch and exits at the “A2” terminal, 960 Yel/Wht wire. This is connected to the X4 connector of the W5 headlight wiring harness. The ground circuit is completed, via a splice, through 120 and 125 Blk wires and to the W4 negative wiring harness and completed by the negative battery cable.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Headlight Circuit Electrical Schematic - All Models

Headlight Circuit Electrical Schematic - All Models


451
Yel
/Wht
200
Red
S1 Key
Switch
L
B
M
0
1
A2
S
A1
G
3
2
1
0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
960
Yel/
Wht
220
Red/
Blk
200
Red
F1
Fuse
20A
201
Red


W6 Engine Wiring Harness - Single Cylinder
X6
220 Red/Blk
451 Yel/Wht
220 Red/Blk
451 Yel/Wht
Red
N1 Voltage Regulator /Rectifier
U
Yel
Blk
G
G2 Stator
451 Yel /Wht
200 Red
S1 Key Switch
L
B
M
0 1
A2
S
A1
G
3 2 1 0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
960 Yel/ Wht
W6 Engine Wiring Harness - V-Twin
X6
220 Red/Blk
451 Yel/Wht
Red
N1 Voltage Regulator /Rectifier
U
Yel
Yel
Blk
Blk
G
G2 Stator
220 Red/ Blk
200 Red
F1 Fuse 20A
201 Red
X1
960 Yel /Wht
X4
Red
Red
W5 Headlight Wiring Harness
Y1 Starting Motor Solenoid
Yel
Blk
E1 and E2 Headlights
G1 Battery
X4
120 Blk
Blk
X2
125 Blk
W1 Shielded Ground
W4 Negative Wiring Harness
Splice #2
Unswitched Power
Ground
Switched Power

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Headlight Circuit Diagnosis - All Models

Headlight Circuit Diagnosis - All Models

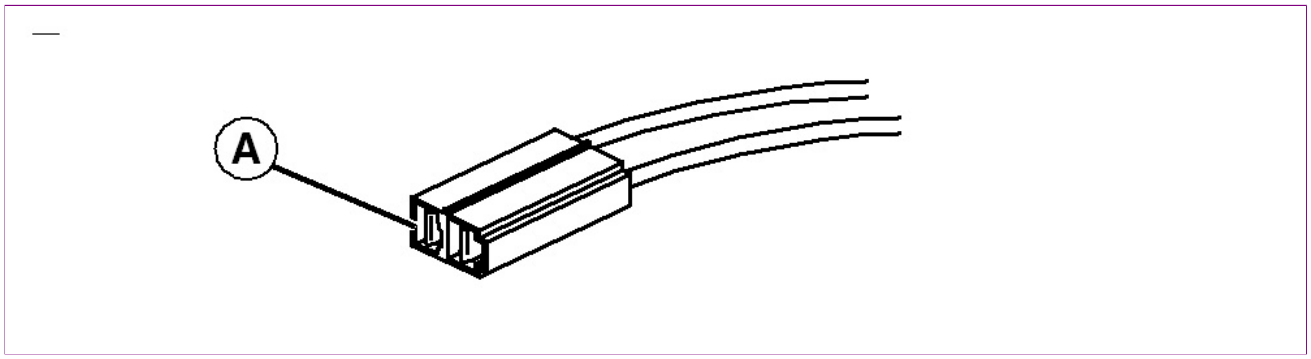
Test Procedure

Test Conditions:

- Machine parked safely. See “Parking Safely” in the Safety section.
- Park brake locked.
- Battery fully charged.
- Charging circuit functioning properly.
- Key switch in ‘run w/lights’ position - engine off.

1 Headlight Circuit

Action:



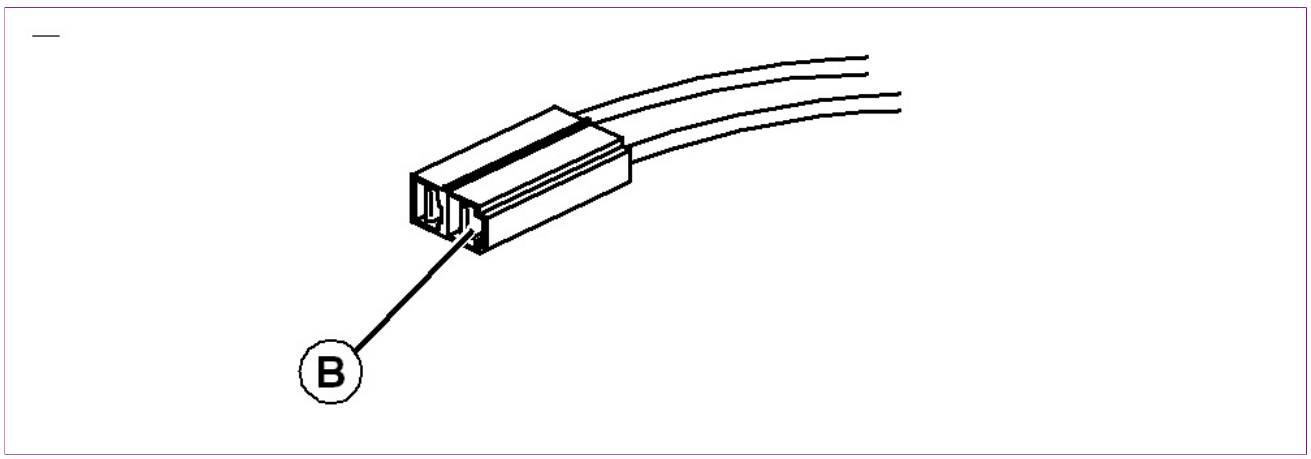
Is battery voltage present at connector X4, E1 and E2 headlight connector Yel wires (A)?

Result:

YES: Go to next step.

NO: Check charging circuit. See Charging Circuit Diagnosis - L100/L105/L107/L110/L120/L130 .

Action:



Is there continuity from headlight Blk wires (B) and ground?

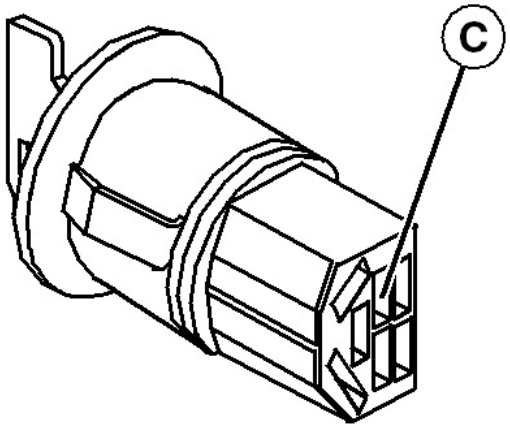
Result:

YES: Go to next step.

NO: Check headlight, 120, 125 Blk wire, and connections.

Action:

—



Is battery voltage present at S1 key switch 960 Yel/Wht wire (C)?

Result:

NO: Check for battery voltage at S1 key switch 451 Yel/Wht wire. Test key switch. See Key Switch Test .

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Hour Meter/Service Indicator Circuit Operation

Hour Meter/Service Indicator Circuit Operation

Function:

To provide power to the hour meter and accumulate time only when the engine is running.

Operating Conditions:

Key switch in the run position with the engine running.

Theory of Operation:

The hour meter counts the total number of hours of operation.

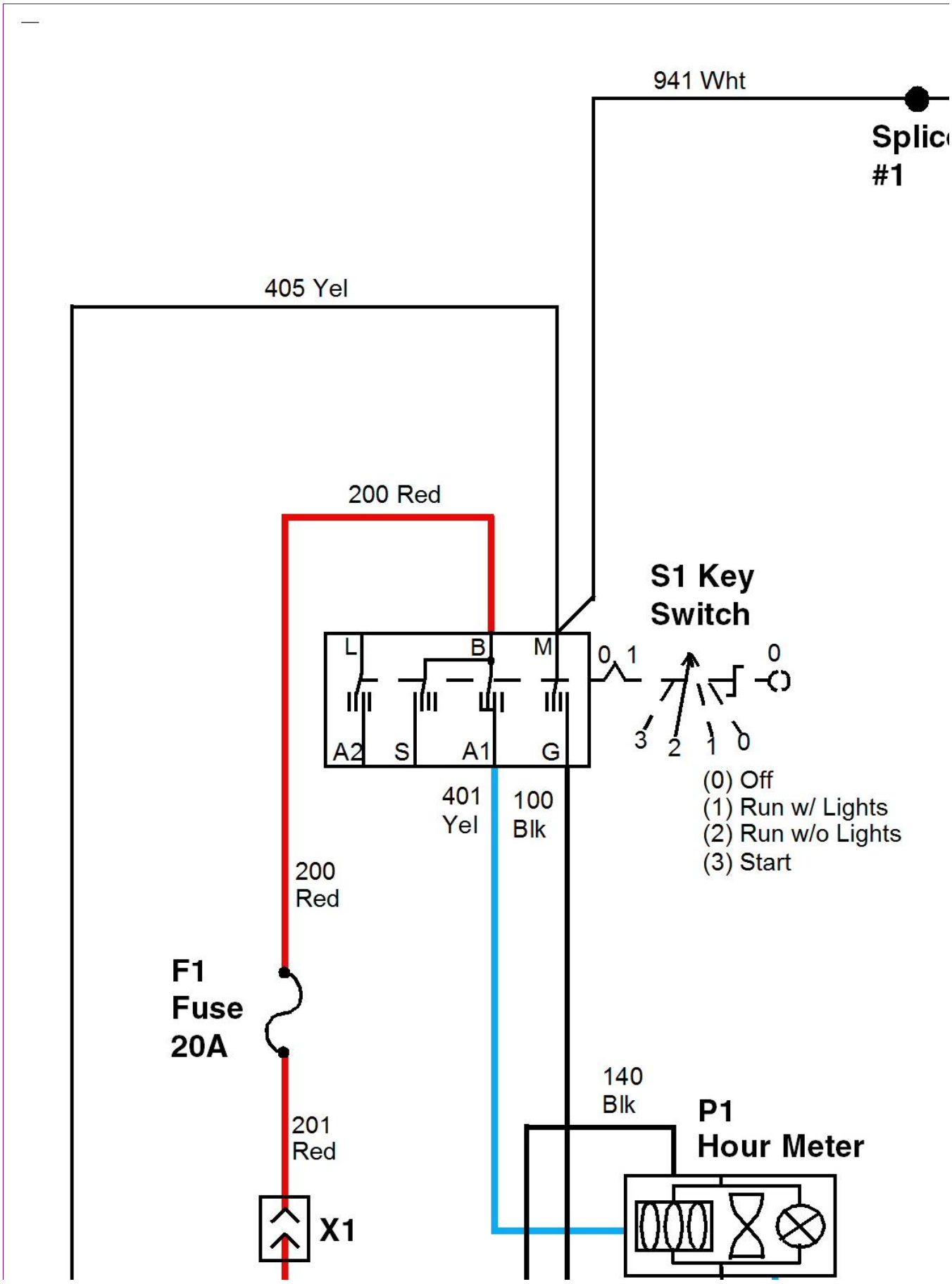
When the key switch is on, without the engine running, the hour meter will turn on via the 502 Yel wire (LA145/165/175) or the 401 Yel wire (LA105.115.125.135) but not increment time. The ground is provided by the 140 and 100 Blk wires to negative wiring harness. The hour meter will then output battery voltage to the fuel shut off circuit. This will allow the machine to run.

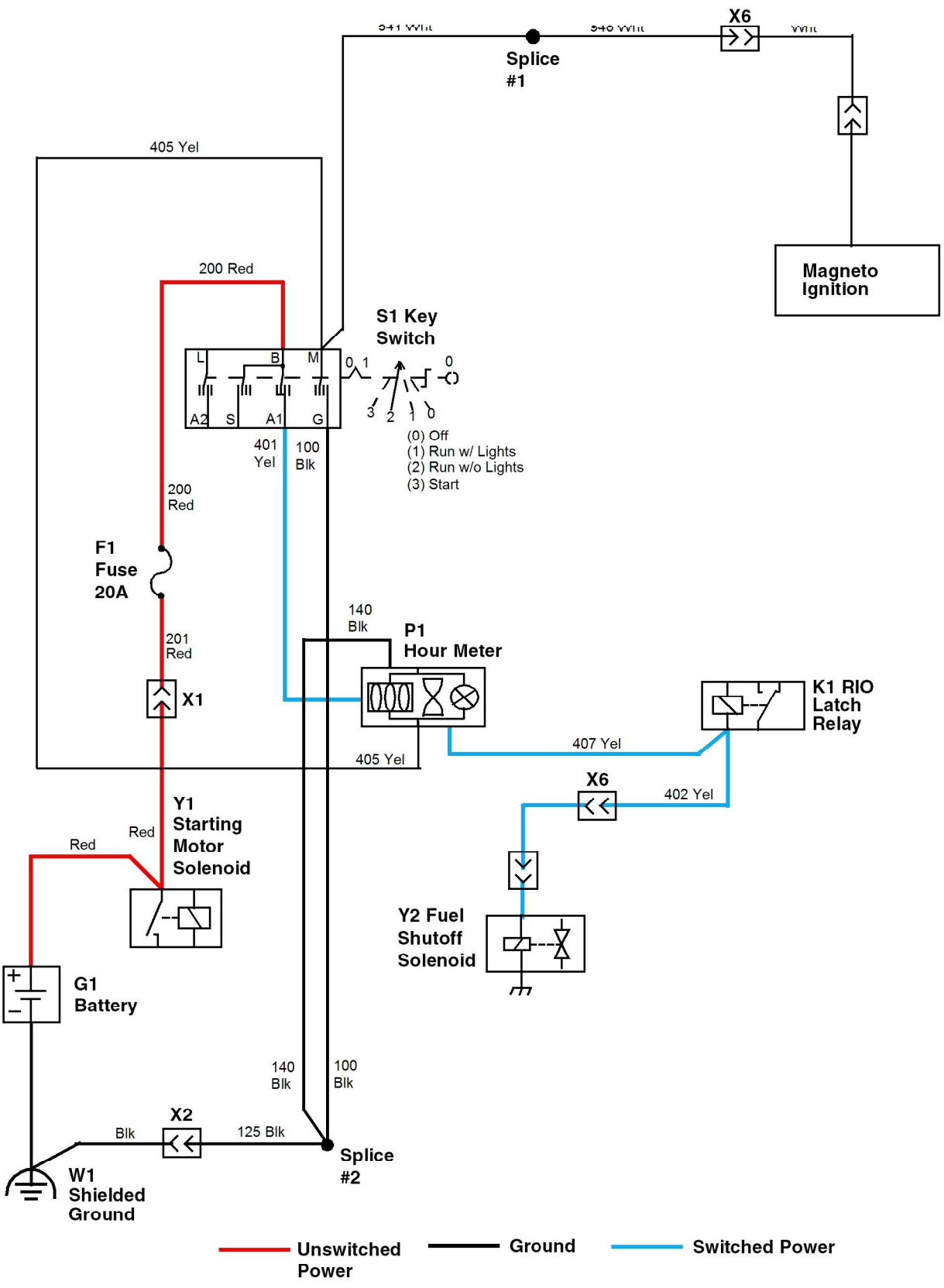
The hour meter counts time while the engine is running only. The hour meter/service indicator receives magneto pulses from the engine magneto and ignition coil(s), 940 and 941 Wht wires, and 405 Yel wire. These pulses only occur during engine operation and are shunted to ground with the key switch in the off position. When these pulses are removed the hour meter will cease to increment time.

A path to ground is provided by 140 (spliced at key switch), 100 and 125 Blk wires to the W4 negative jumper wiring harness.

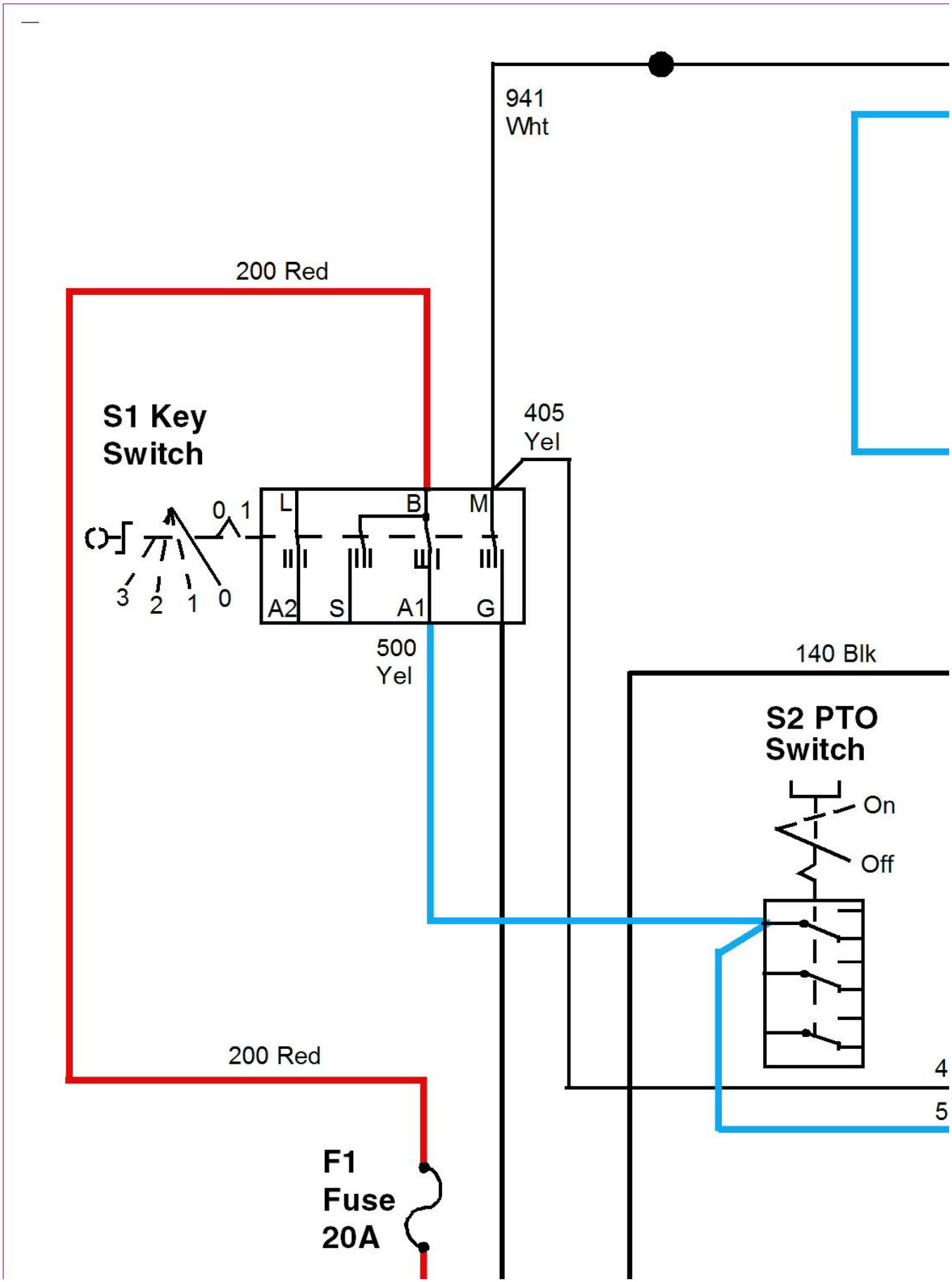
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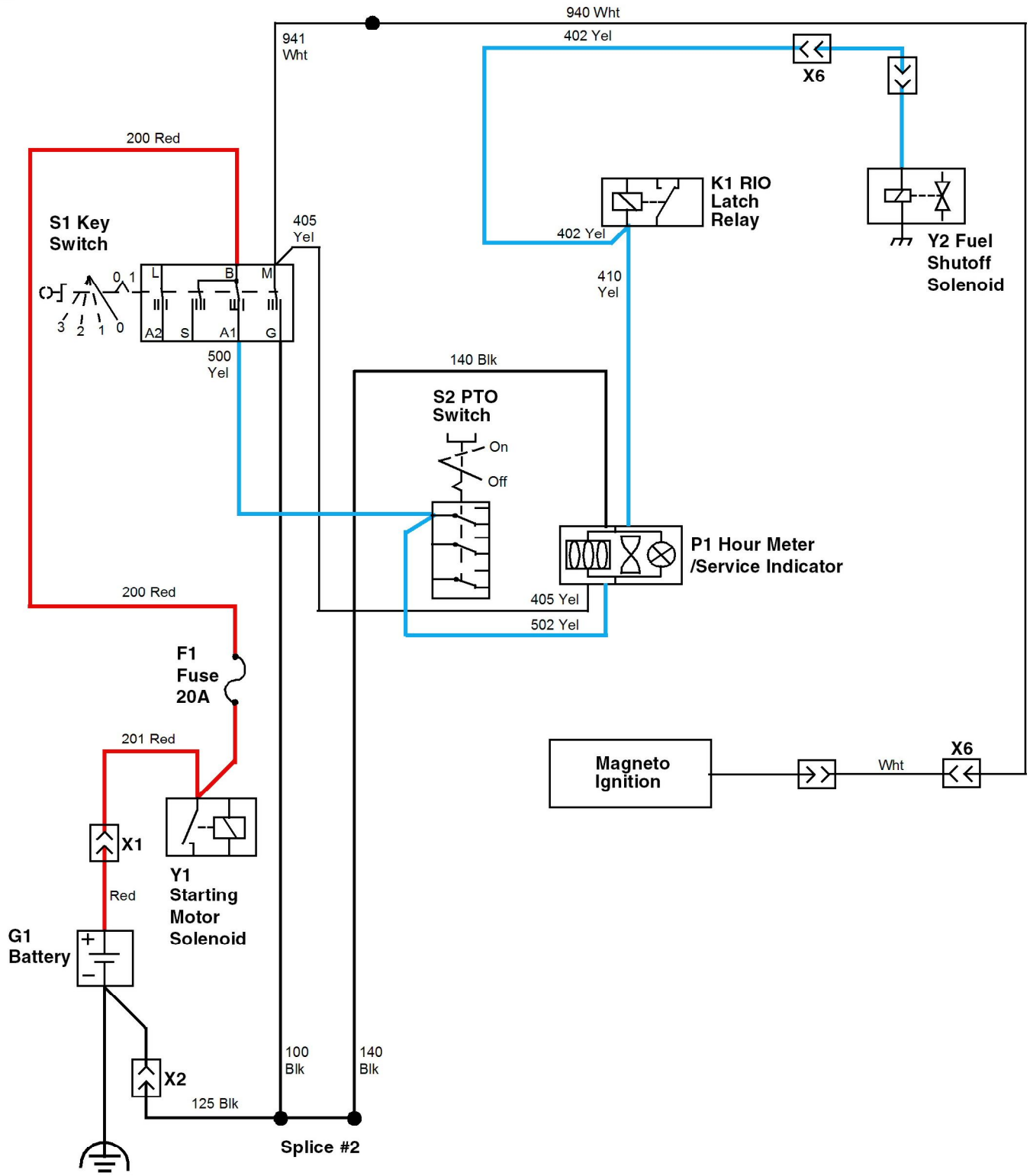
Hour Meter/Service Indicator Circuit Schematic - LA105/115/125/135


941 Wht
Splic
#1
405 Yel
200 Red
S1 Key
Switch
L
B
M
0
1
0
A2
S
A1
G
3
2
1
0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
401
Yel
100
Blk
200
Red
F1
Fuse
20A
140
Blk
P1
Hour Meter
201
Red
X1


X6
Splice
#1
405 Yel
Magneto
Ignition
200 Red
S1 Key
Switch
L
B
M
A2
S
A1
G
0 1
0
3 2 1 0
(0) Off
(1) Run w/ Lights
(2) Run w/o Lights
(3) Start
401
Yel
100
Blk
200
Red
F1
Fuse
20A
201
Red
X1
140
Blk
P1
Hour Meter
K1 RIO
Latch
Relay
407 Yel
405 Yel
X6
402 Yel
Y1
Starting
Motor
Solenoid
Red
Red
Y2 Fuel
Shutoff
Solenoid
G1
Battery
140
Blk
100
Blk
X2
Blk
125 Blk
Splice
#2
W1
Shielded
Ground
Unswitched
Power
Ground
Switched Power

Hour Meter/Service Indicator Circuit Schematic - LA145/155/165/175


941
Wht
200 Red
S1 Key
Switch
405
Yel
0 1
L
B
M
3 2 1 0
A2
S
A1
G
500
Yel
140 Blk
S2 PTO
Switch
On
Off
200 Red
4
5
F1
Fuse
20A


940 Wht
941
Wht
402 Yel
X6
200 Red
K1 RIO
Latch
Relay
S1 Key
Switch
405
Yel
402 Yel
410
Yel
Y2 Fuel
Shutoff
Solenoid
0 1
L
B
M
3 2 1 0
A2
S
A1
G
500
Yel
140 Blk
S2 PTO
Switch
On
Off
P1 Hour Meter
/Service Indicator
405 Yel
502 Yel
200 Red
F1
Fuse
20A
201 Red
Magneto
Ignition
Wht
X6
X1
Y1
Starting
Motor
Solenoid
Red
G1
Battery
X2
100
Blk
140
Blk
125 Blk
Splice #2

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Hour Meter/Service Indicator Circuit Diagnosis

Hour Meter/Service Indicator Circuit Diagnosis

Equipment:

- Volt Ohm Meter

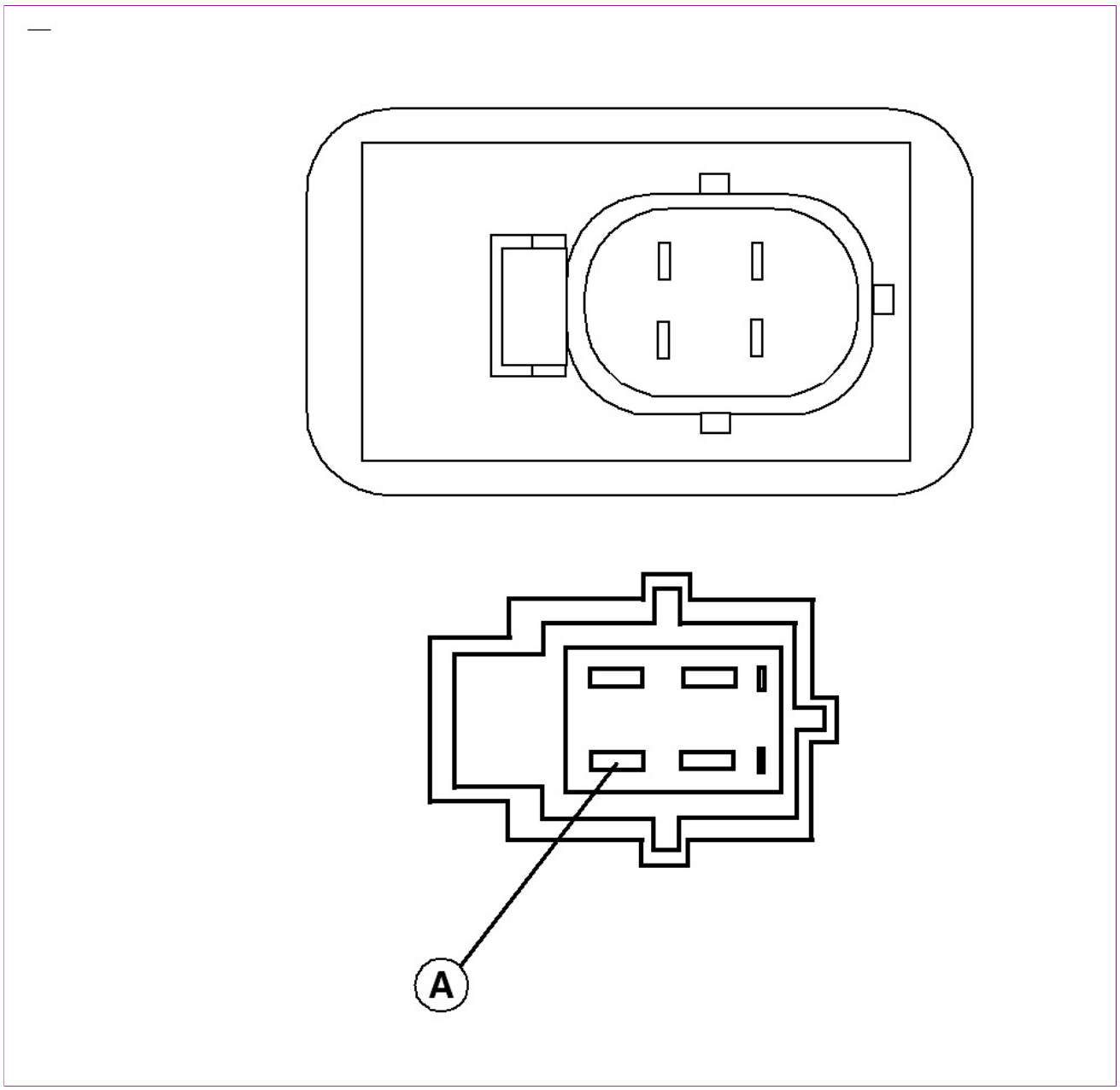
Test Procedure:

Test Conditions:

- Park machine safely. See “Parking Safely” in the Safety section.
- Park brake locked.
- Battery fully charged.
- Power circuits checked and OK.
- Key switch in run position - engine off.

1 Hourmeter Circuit

Action:



Is continuity to present between 140 Blk wire (A) at hourmeter connector and ground?

Result:

YES: Go to next step.

NO: Check 140 and 125 Blk wires and connections. Check W4 negative jumper wiring harness.

Test Conditions:

- Meter leads connected to wiring harness connector.
- Key switch to start position - engine started for test.

CAUTION:

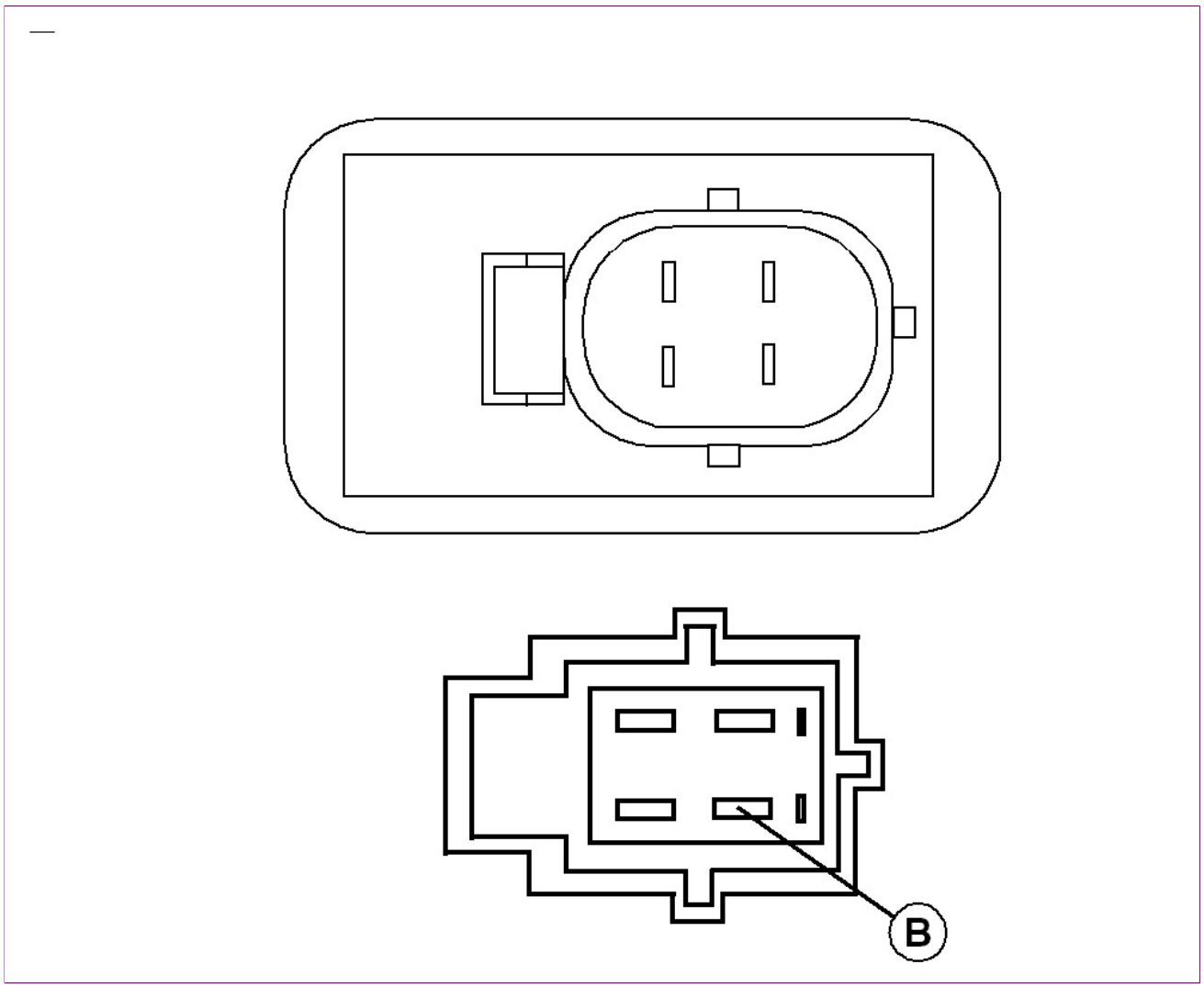
Keep clear of moving engine parts.

IMPORTANT:

Keep electrical leads and wires away from moving engine parts.

1 Hourmeter Circuit

Action:



Is 12 VAC present at P1 hourmeter 407 Yel wire (B) when the engine is started.

Result:

YES: Replace P1 hourmeter.

NO: Check engine wiring harness, X6 connector, 940 and 941 Wht wires, 407 Yel wire, and connections. If OK, test key switch. See Key Switch Test .

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Ground Circuit Tests

Ground Circuit Tests

Reason:

To check for opens, loose terminal wire crimps, poor connections, or corrosion in the ground circuit. The voltmeter method checks ground connections under load.

Equipment:

- Ohmmeter or Voltmeter

Ohmmeter Procedure:

1. Turn key switch to OFF position. Engage park brake.
2. Connect ohmmeter negative (BLACK) lead to negative (-) terminal of battery. Put meter positive (RED) lead on negative terminal of battery and record reading. Reading should be 0.1 ohm or less.
3. Put meter RED lead on ground terminal of circuit or component to be tested that is closest to the battery negative terminal. Resistance reading must be very close to or the same as the battery negative terminal reading. Work backwards from the battery on the ground side of the problem circuit until the resistance reading increases above 0.1 ohms. The problem is between the last two test points. If a problem is indicated, disconnect the wiring harness connector to isolate the wire or component and check resistance again. Maximum allowable resistance in the circuit is 0.1 ohms. Check both sides of connectors closely as disconnecting and connecting may temporarily solve problem.

Voltmeter Procedure:

1. Put transmission in neutral. Engage park brake. Put PTO switch in off position. Turn key switch to on position.
2. Connect voltmeter negative (BLACK) lead to negative (-) terminal of battery.
3. Put meter positive (RED) lead on ground terminal of component to be tested. Be sure the component circuit is activated (key switch on, switches closed) so voltage will be present at the component. Record voltage. Voltage must be greater than 0 but less than 1 volt. Some components will have a very small voltage reading on the ground side and still be operating correctly.

Results:

- If resistance is above 0.1 ohms, check for open wiring, loose terminal wire crimps, poor connections, or corrosion in the ground circuit
- If voltage is 0, the component is open
- If voltage is greater than 1 volt, the ground circuit is bad. Check for open wiring, loose terminal wire crimps, poor connections, or corrosion in the ground circuit.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Battery Voltage and Specific Gravity Tests

Battery Voltage and Specific Gravity Tests

Reason:

To check voltage and determine condition of battery.

Equipment:

- Voltmeter or JTO5685 Battery Tester
- Hydrometer Procedure
- Clean battery terminals and top of battery

Procedure:

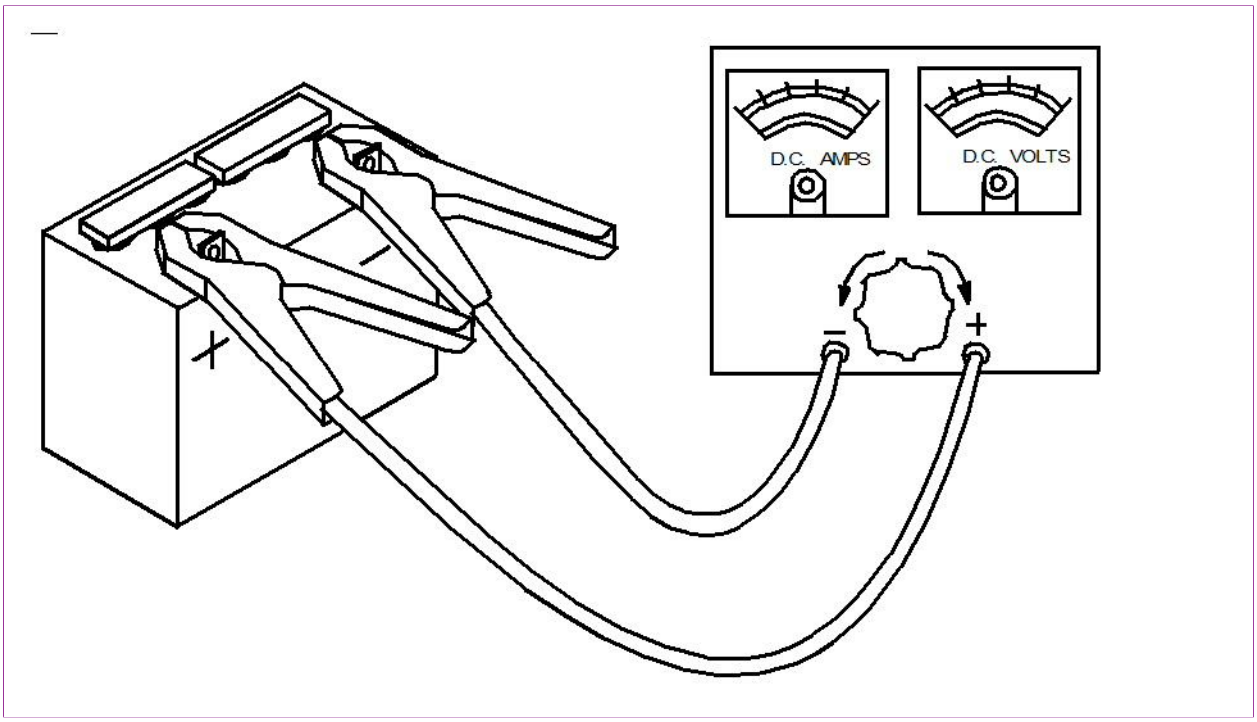
CAUTION:

Battery electrolyte contains sulfuric acid. It is poisonous and can cause serious burns:

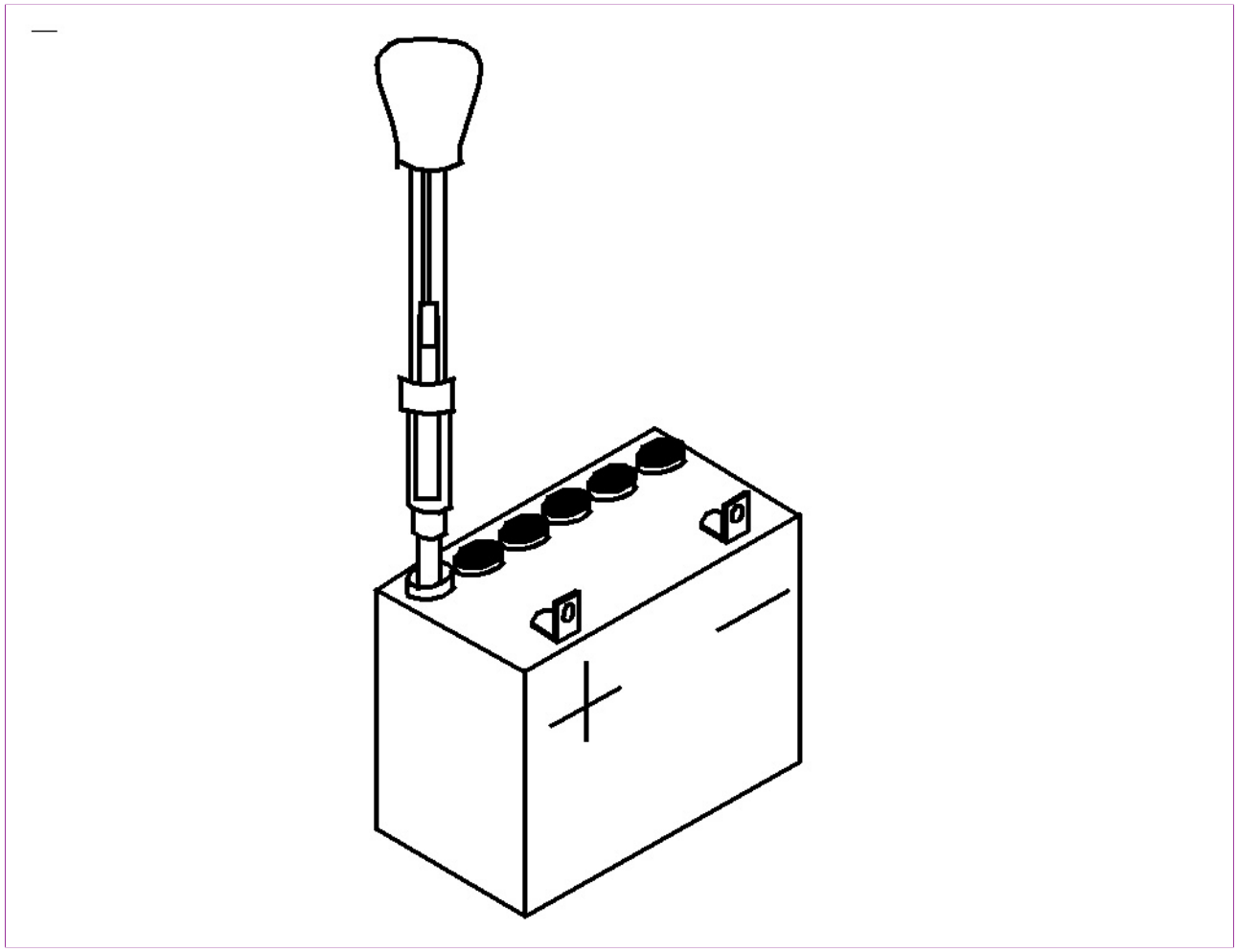
- ***Wear eye protection and gloves.***
- ***Keep skin protected.***
- ***If electrolyte is swallowed, get medical attention immediately.***
- ***If electrolyte is splashed into eyes, flush immediately with water for 15-30 minutes and get medical attention.***
- ***If electrolyte is splashed onto skin, flush immediately with water and get medical attention if necessary.***

The battery produces a flammable and explosive gas. The battery may explode:

- ***Do not smoke near battery.***
- ***Wear eye protection and gloves.***
- ***Do not allow direct metal contact across battery posts.***
- ***Remove negative cable first when disconnecting.***
- ***Install negative cable last when connecting.***

1. Park machine safely. See “Parking Safely” in the Safety section.
2. Inspect battery terminals and case for breakage or cracks.
3. Check electrolyte level in each battery cell. Add clean, soft water as needed. If water added, charge battery for 20 minutes at 10 amps.
4. Remove surface charge by placing a small load on the battery for 15 seconds.
5. 

Check battery voltage with voltmeter or JTO5685 battery tester.

6. 
Use an hydrometer to check for a minimum specific gravity of **1.265** with less than **50** point variation in each cell at full charge at **26.7C (80F)** .

Results:

- Battery voltage less than **12.4 VDC** , charge battery.
- Battery voltage more than **12.4 VDC** , test specific gravity.
- All cells less than **1.175** , charge battery at 10 amp rate.
- All cells less than **1.225** with less than 50 point variation, charge battery at 10 amp rate.
- All cells more than **1.225** with less than 50 point variation, load test battery.
- More than **50** point variation: replace battery.

Item	Measurement	Specification
Specifications:		
Minimum battery voltage		12.4 volts
Minimum specific gravity		1.225 with less than 50 point variation

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Charge Battery

Charge Battery

Reason:

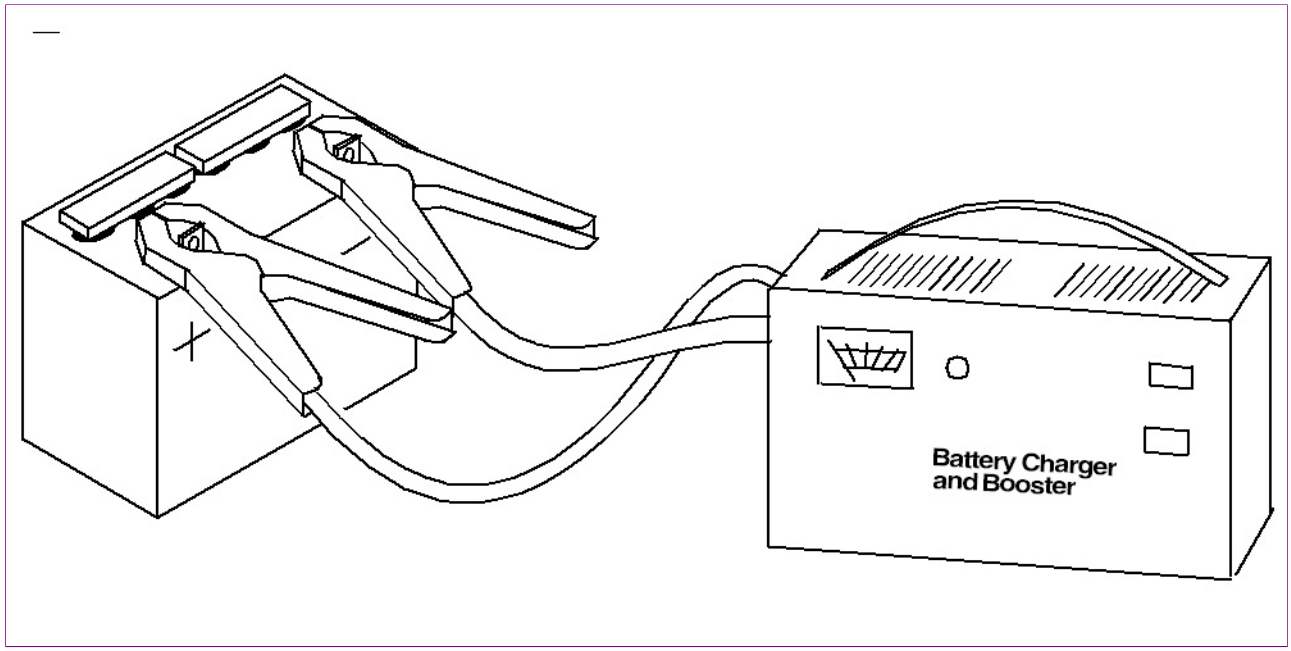
To increase battery charge after the battery has been discharged.

Equipment:

- Battery charger (variable rate)

Procedure:

1. Park machine Safely with park brake locked. See “Parking Safely” in the Safety section.
2. Raise hood.
3. Clean cable ends, battery terminals and top of battery.
4. Remove battery to workbench.



5. Connect variable rate charger to battery.
6. *NOTE:*

   Maximum charge time at boost setting is 10 minutes. Allow an additional 5 minutes for each 10 degrees below 21 C (70 F).

   Start charger at slow rate. Increase charge rate one setting at a time. Check charger ammeter after 1 minute at each setting. Maintain 10 amp charge rate. Use boost setting as necessary.
7. Check if battery is accepting 10 amp charge rate after 10 minutes at boost setting.
   - If battery will not accept 10 amp charge after 10 minutes at boost setting, replace battery;
   - If battery is accepting 10 amp charge after 10 minutes at boost setting, and battery did not need water, go to next steps.
   - If battery is accepting 10 amp charge after 10 minutes at boost setting, but battery did need water or all cells were below 1.175, go to next step.
8. **IMPORTANT:**

   Decrease charge rate if battery gases or bubbles excessively or becomes too warm to touch.

   Set charger at 15 - 25 amps.
9. *NOTE:*

   If battery was discharged at slow or unknown rate, charge at 10 - 15 amps for 6 - 12 hours (Maintenance-free battery: 12 - 24 hours). If battery was discharged at fast rate, charge at 20 - 25 amps for 2 - 4 hours (Maintenance-free battery: 4 - 8 hours).

   Check specific gravity after 30 minutes (60 minutes for maintenance-free battery).
   - If more than 50 point variation between cells, replace battery;
   - If less than 50 point variation between cells, go to next steps.
10. Continue to charge battery until specific gravity is 1.250 - 1.265 points.
11. Load test battery.
12. Install battery.

Battery - Load Test

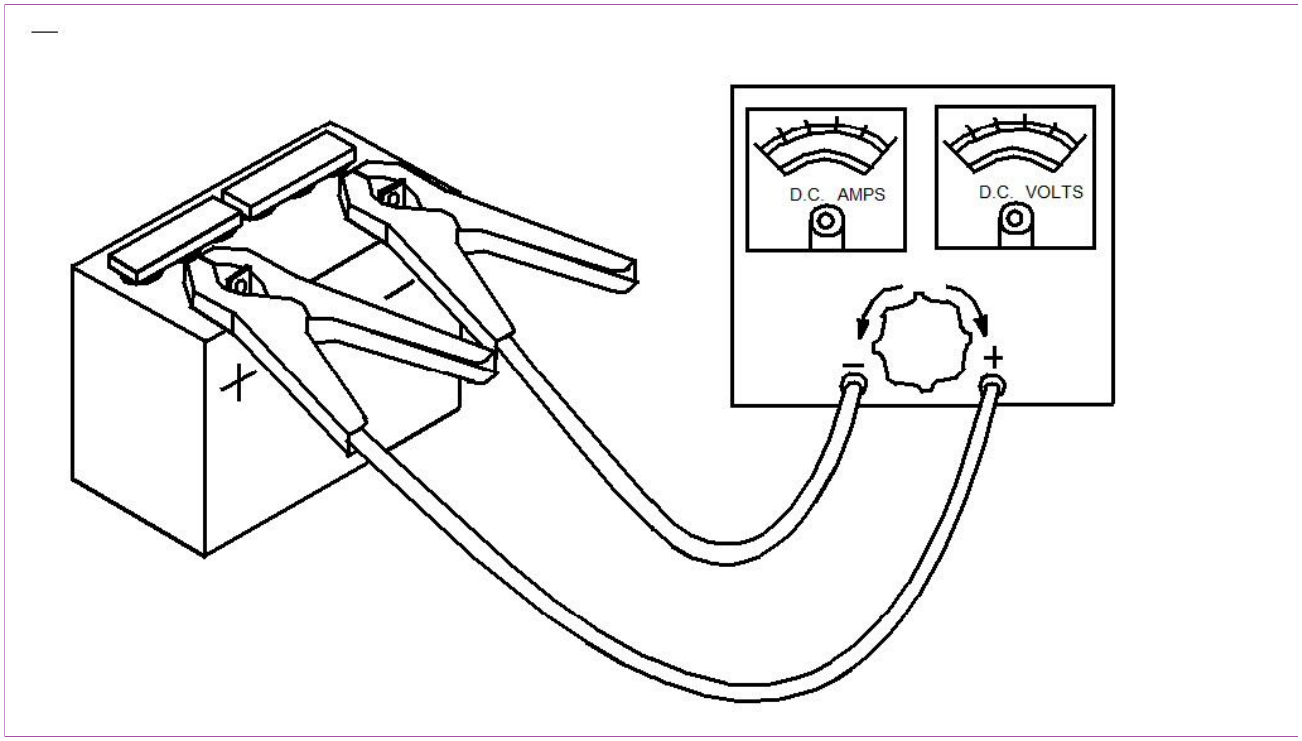
Reason:

To check condition of battery under load.

NOTE:

Charge battery before performing load test.

Equipment:



- JTO5685 Battery Tester or equivalent

NOTE:

Use the procedures given with the tester.

Procedure:

1. Turn load knob of tester clockwise until amperage reading is equal to:
   - Cold cranking amperage rating (use blue scale)

     OR

     Three times ampere hour rating (use black scale).
2. Hold for 15 seconds and turn load knob of tester off.
3. Read battery voltage.

Results:

- If the battery does not indicate 9.6 volts or more, replace battery.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Solenoid Test - All Models

Starting Solenoid Test - All Models

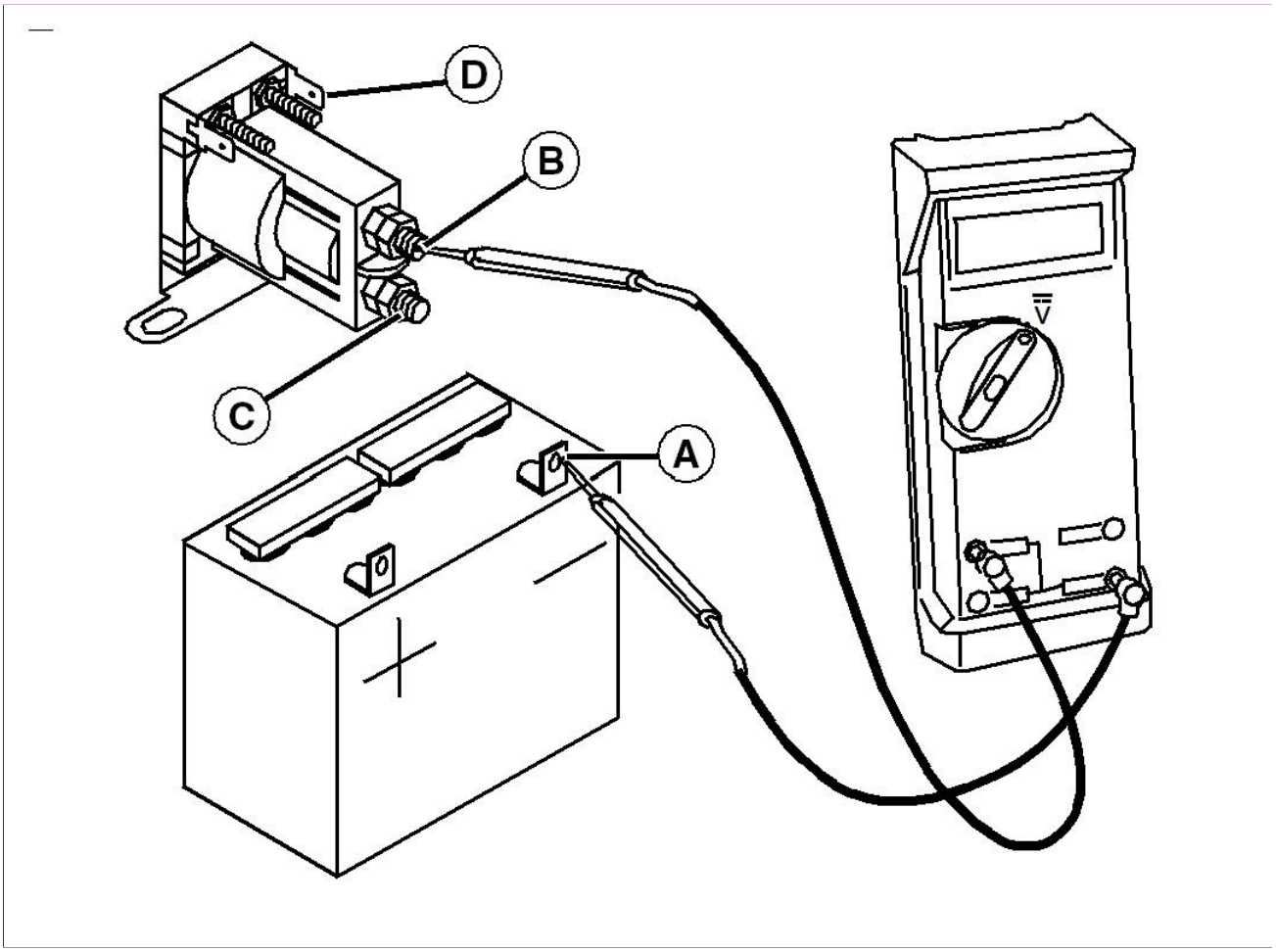
Reason:

To determine if starting solenoid is defective.

Equipment:

- Volt Ohm Meter

Procedure:

1. Park machine safely with park brake locked. See “Parking Safely” in the Safety section.
2. Raise hood.
3. Disconnect and ground spark plug leads.
4. 

Connect VOM to negative (-) battery terminal (A) and terminal (B) of starting motor solenoid. Check for battery voltage.
   - **No battery voltage - Check battery positive (+) terminal and starting motor solenoid terminal (B) for loose connections. Clean any corrosion.**
   - **Battery voltage - go to next step.**
5. Connect VOM to negative (-) battery terminal (A) and terminal (C) of starting motor solenoid.
6. Momentarily turn ignition key to start position and check for battery voltage.
   - **Battery voltage - starting motor solenoid is not defective.**
   - **No battery voltage - go to next step.**
7. Connect VOM to negative (-) battery terminal (A) and terminal (D) (Pur wire) of starting motor solenoid.
8. Momentarily turn ignition key to start position and check for battery voltage.
   - **No battery voltage - Check Pur wire and connections.** See appropriate cranking circuit diagnosis in this section.
   - **Battery voltage - Check Blk wire and connections between starting motor solenoid and frame ground. If OK, starting motor solenoid is defective, replace solenoid.**

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Starting Motor Amperage Draw Test - Loaded

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Starting Motor Amperage Draw Test - Loaded

Reason:

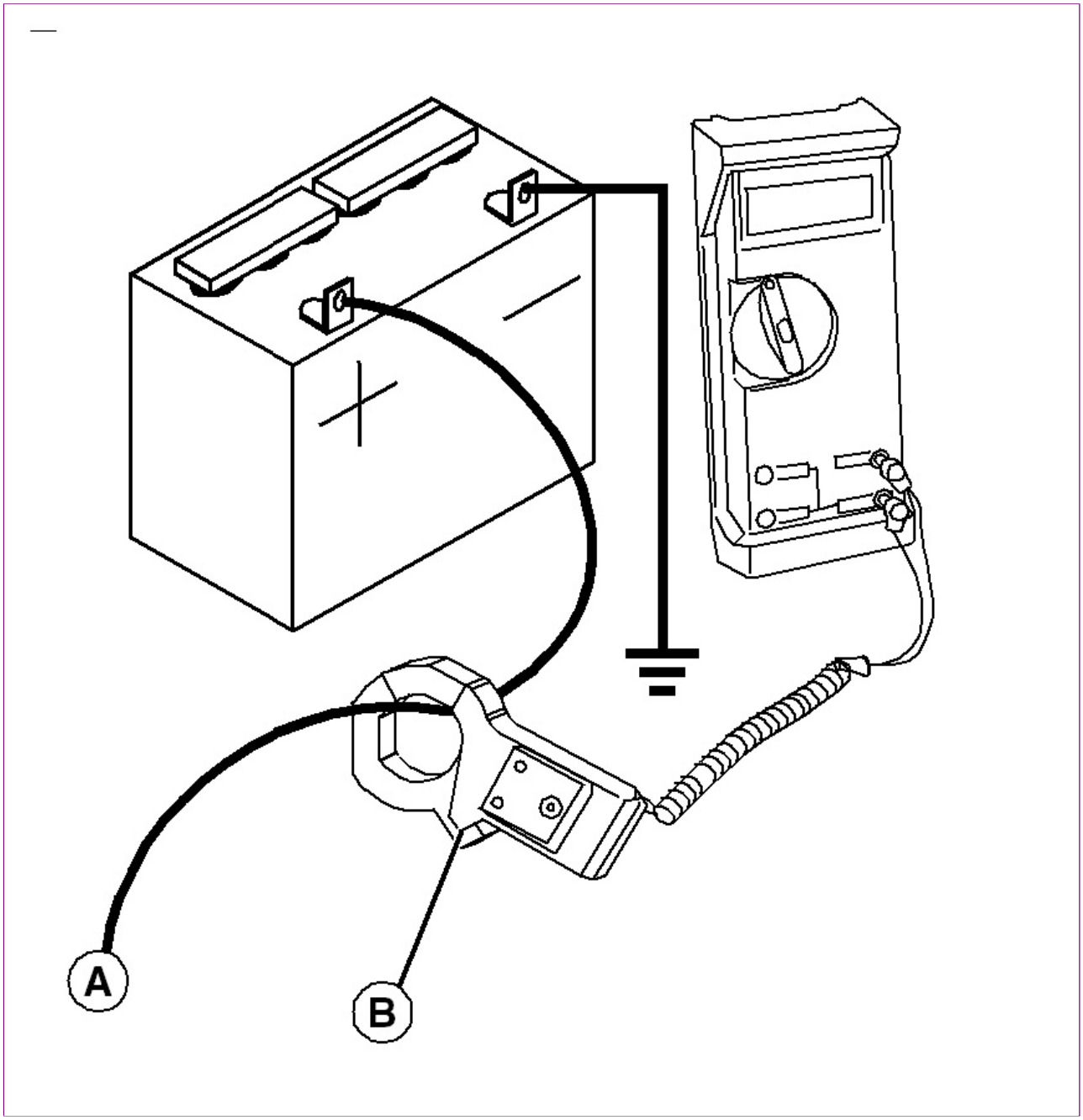
To determine amperage needed to crank the engine.

Required Tools:

- JT05791 Multimeter
- JT02153 Current Clamp

Procedure:

1. Ensure transmission is in neutral and park brake is set.
2. Remove spark plug lead and ground to engine.
3. Connect current clamp RED lead to the VOLTS jack of the multimeter and the BLACK lead of the current clamp to the COM jack on the multimeter.

4. 

LEGEND:

A - To starter solenoid

Clamp jaws of current clamp (B) around the positive battery cable.

5. Set the current clamp to 2000A and the multimeter to 300mV.
6. *NOTE:*

   The core of the jaws may hold some magnetic force after the current clamp has been used for measurement. If you cannot zero adjust the display, open the jaws and snap them closed several times.

   Adjust the DCA ZERO ADJUST dial on the current clamp for a zero reading on the multimeter.
7. *NOTE:*

   If using a multimeter other than JT05791, use a meter that will read millivolts. Millivolts = current in amps; 1m V= 1 amp.

   Crank the engine and read the starting motor amperage draw.

Result:

- If amperage is above specification check starting motor for binding or damaged wires or windings.
- If starting motor is good, check internal engine and PTO drive for binding or damage.

Item	Measurement	Specification
Specifications - LA105/115/125/135:		
Maximum starting motor amp draw		100 amps

Item	Measurement	Specification
Specifications - LA145/165/175:		
Maximum starting motor amp draw		180 amps

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Starting Motor Amperage Draw Test - No-Load

Starting Motor Amperage Draw Test - No-Load

Reason:

To determine starting motor condition under no-load conditions.

Required Tools:

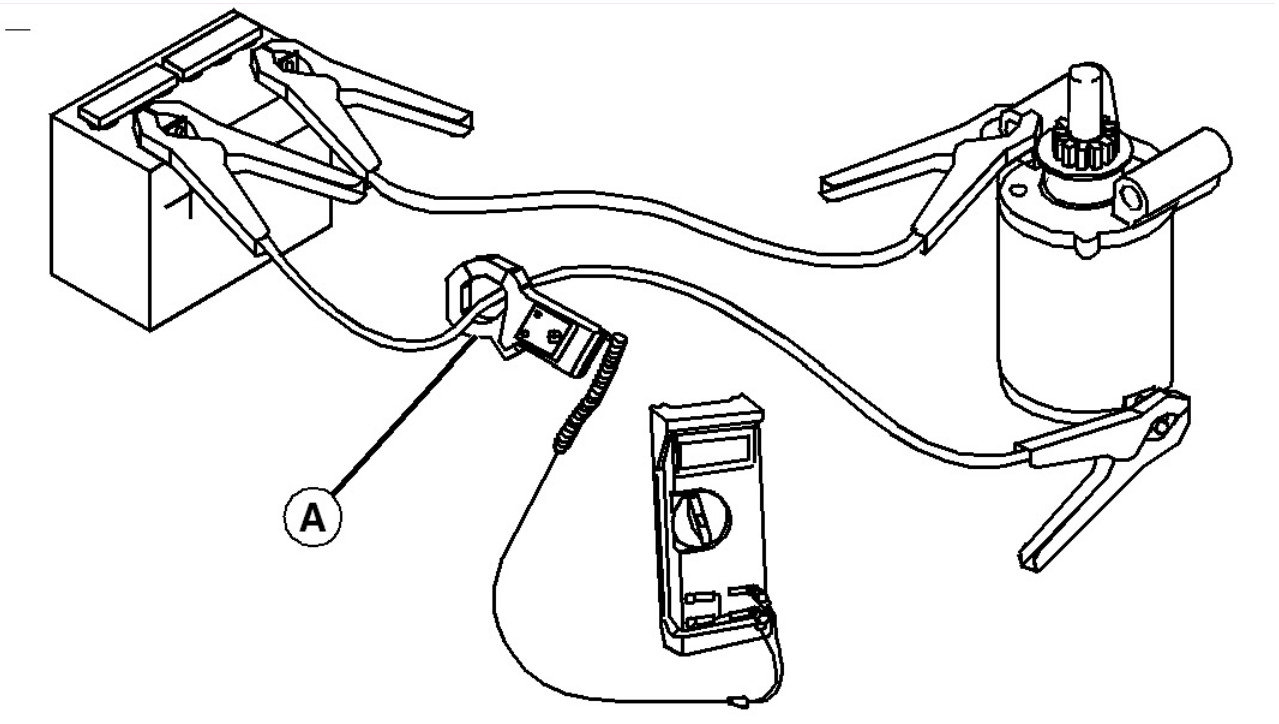
- JT05791 Multimeter
- JT02153 Current Clamp
- 12 Volt Battery
- Jumper Cables

Procedure:

1. ***CAUTION:***

   Do not clamp starting motor housing in vise or strike with a hammer. Clamp only on the mounting bracket. Starting motors contain two ceramic magnets that can be broken or cracked if the motor housing is hit, deformed or dented.

   Remove starting motor from machine and clamp the starting motor mounting bracket in a vise.

2. 

   Connect current clamp (A) RED lead to the VOLTS jack of the multimeter and the BLACK lead of the current clamp to the COM jack on the multimeter.
3. Connect the negative jumper cable to the battery negative post and the frame of the starting motor.
4. Connect the positive jumper cable to the positive post of the battery.
5. Connect current clamp RED lead to the VOLTS jack of the multimeter and the BLACK lead of the current clamp to the COM jack on the multimeter.
6. Clamp jaws of current clamp around the positive jumper cable.
7. Set the current clamp to 2000A and the multimeter to 300mV.
8. *NOTE:*

   The core of the jaws may hold some magnetic force after the current clamp has been used for measurement. If you cannot zero adjust the display, open the jaws and snap them closed several times.

   Adjust the DCA ZERO ADJUST dial on the current clamp for a zero reading on the multimeter.
9. *NOTE:*

   If using a multimeter other than JT05791, use a meter that will read millivolts. Millivolts = current in amps; 1mV = 1 amp.

   Momentarily touch the positive jumper cable lead to the starting motor positive post and read the starting motor amperage draw.

Result:

- If amperage is above specification, check starting motor for binding or damage.

Item	Measurement	Specification
Specification:		
Maximum starting motor amp draw		35 amps

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Flywheel Ignition Magnet Test

Flywheel Ignition Magnet Test

Reason:

To make sure flywheel magnet(s) have enough force to induce current into ignition coil.

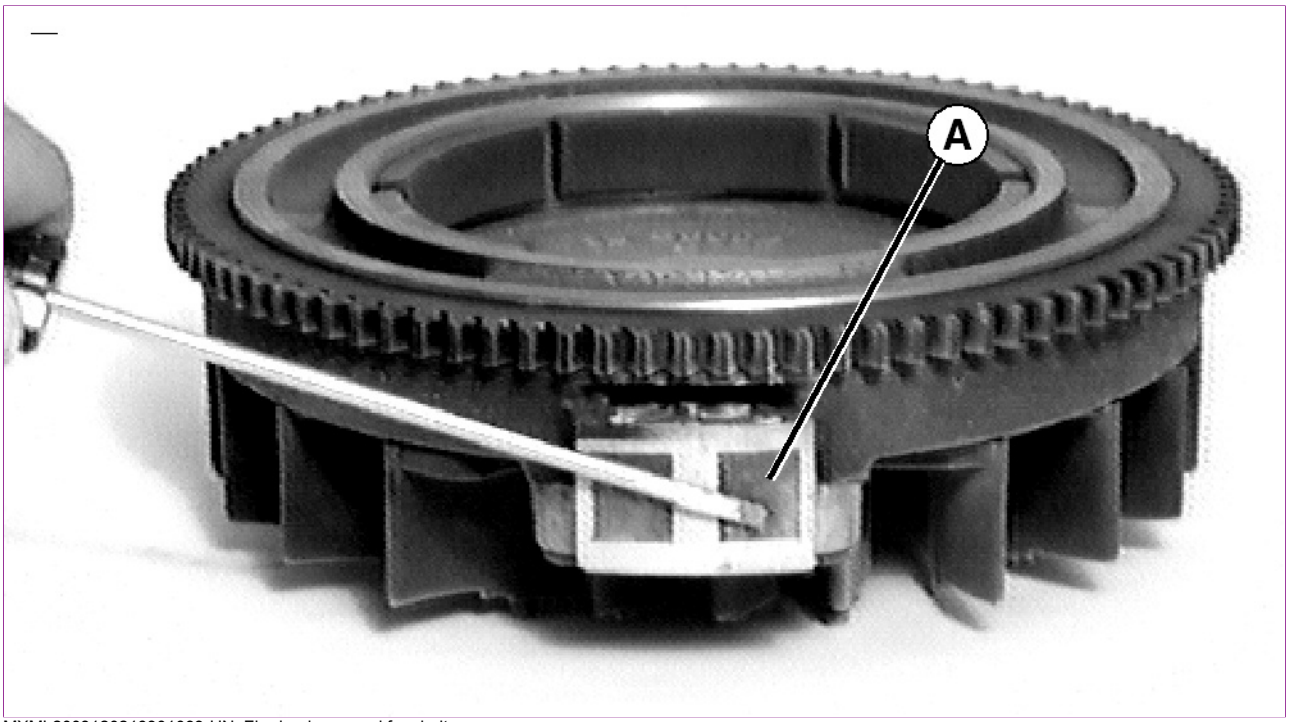
Equipment:

- Screwdriver.

Procedure:

1. Park machine on level surface.
2. Turn key switch to off position.
3. Move forward/reverse pedals to neutral position.
4. Engage park brake.
5. Raise hood.
6. Remove flywheel blower housing from engine.
7. *NOTE:*

   LA145/65/175 models have two ignition magnets on flywheel. LA105/115/125/135 models have one.



MXML2008120216301093-UN: Flywheel removed for clarity

Loosely hold screwdriver blade about **25 mm (1.0 in.)** away from magnet (A).

Results:

- Magnet should attract blade to it.
- If blade is not attracted to magnet, flywheel must be replaced.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Flywheel Stator Magnets Test

Flywheel Stator Magnets Test

Reason:

To make sure flywheel magnet have enough force to induce current into stator.

Equipment:

- Screwdriver

Procedure:

1. Park machine safely with park brake locked. See “Parking Safely” in the Safety section.
2. Raise hood.
3. Remove flywheel blower housing from engine.
4. Remove flywheel. See engine section.
5. 

MXML2008120216301094-19: Size of magnets may vary between models

   Loosely hold screwdriver blade about **25 mm (1.0 in.)** away from magnet (A).

Results:

- Magnet should attract blade to it.
- If blade is NOT attracted to magnet, flywheel must be replaced.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Regulated Voltage Test

Regulated Voltage Test

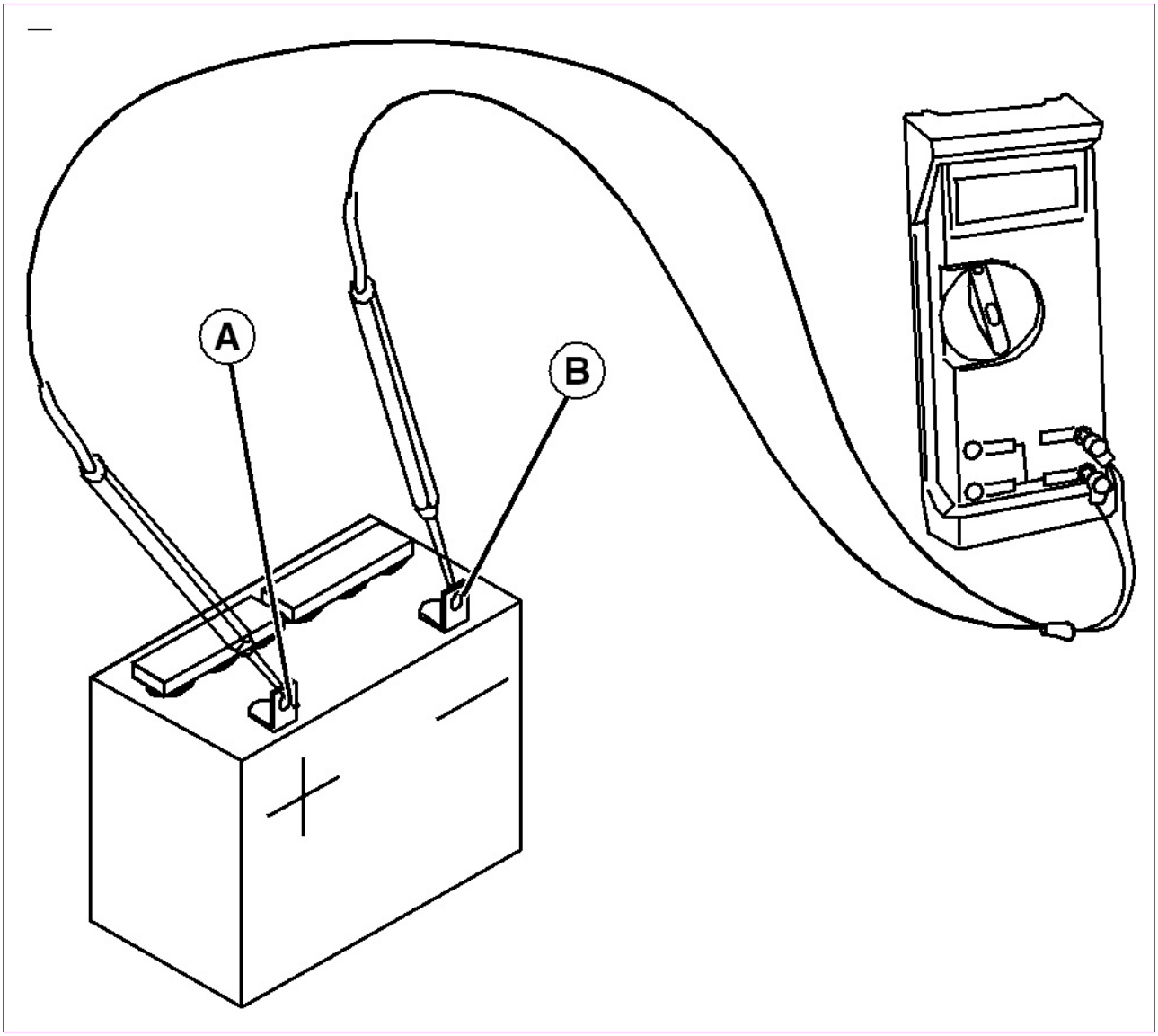
Reason:

To determine regulated voltage output of the regulator/rectifier.

Equipment:

- Multimeter

Procedure:

1. Park machine Safely with park brake locked. See “Parking Safely” in the Safety section.
2. Raise hood.
3. Remove surface charge from battery by placing a small load on the battery for 15 seconds.
4. Set voltmeter to 50 DC volt scale.
5. 

Connect voltmeter positive (red) lead to battery positive (+) terminal (A).
6. Connect voltmeter negative (black) lead to battery negative (-) terminal (B).
7. Start and run engine at fast idle. Read voltmeter several times during 5 minutes of running time.
8. Voltage should remain between 12.2 - 14.7 volts DC.

Results:

- If the DC voltage remains below the minimum specification, test stator voltage output.
- If the DC voltage goes above the maximum specification, replace the regulator/rectifier.

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Stator Output Test

Stator Output Test

Reason:

To measure AC voltage output of stator and verify correct resistance of stator.

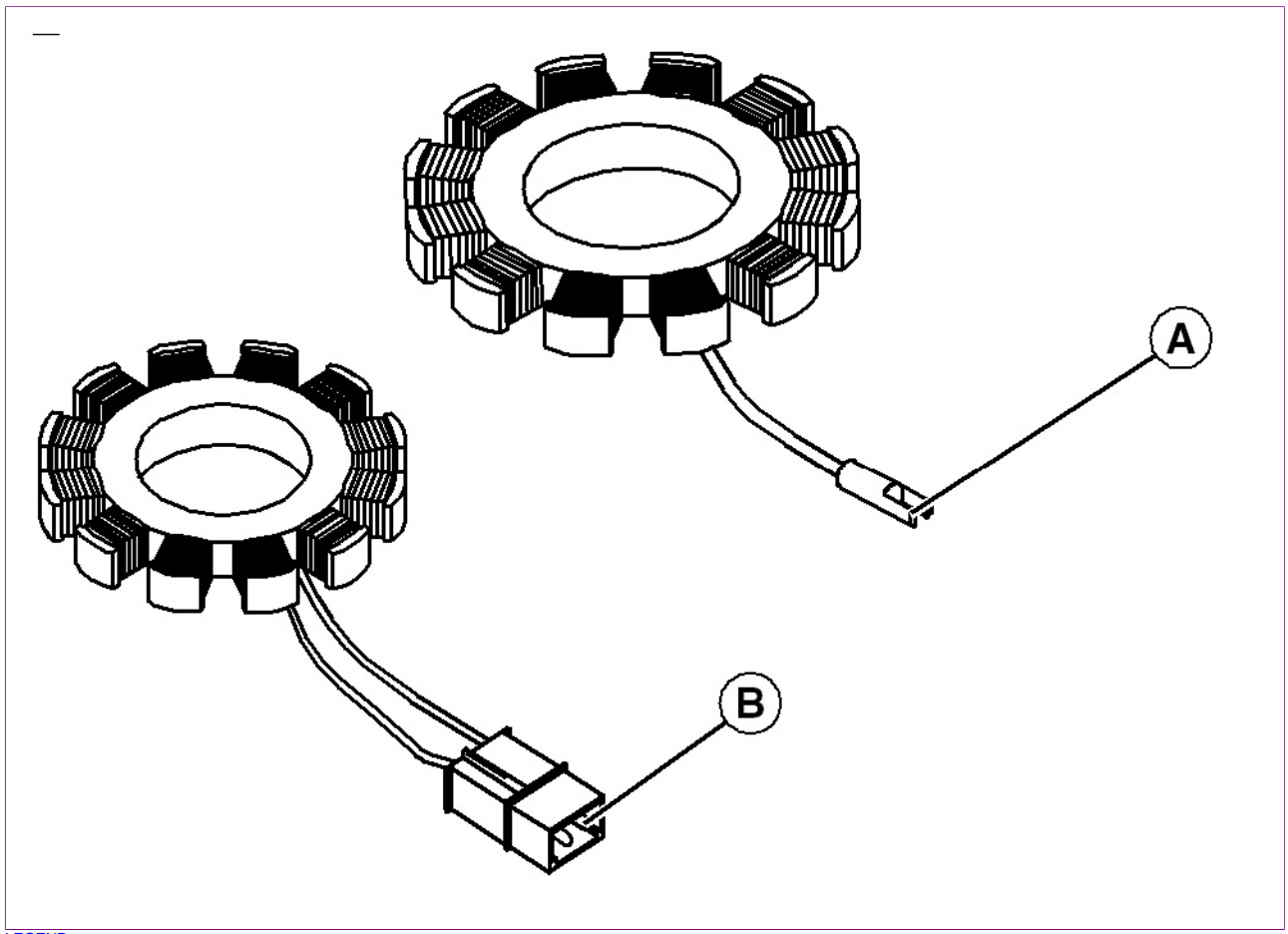
Equipment:

- Multimeter

Procedure:

1. Disconnect connector from stator.
2. Set multimeter for AC volts.
3. *NOTE:*

   LA105 model has only one stator lead.



LEGEND:

A - LA105/115/125/135
B - LA145/165/175

Attach RED test lead to either pin on stator side of stator connector.

4. *NOTE:*

   On single wire lead models, attach BLACK test lead to engine ground.

   On two wire lead models, attach BLACK test lead to other pin.
5. Set parking brake, start engine and run at full throttle.
6. Check output.

Results:

- Output should be to specification.

- If no or low output is found, replace stator.

Item	Measurement	Specification
Specifications - LA105/115/125/135:		
AC output at full throttle		40 volts (minimum)

Item	Measurement	Specification
Specifications - LA145/165/175:		
AC output at full throttle		30 volts (minimum)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Regulated Amperage Test

Regulated Amperage Test

Reason:

To determine charging output of rectifier/regulator.

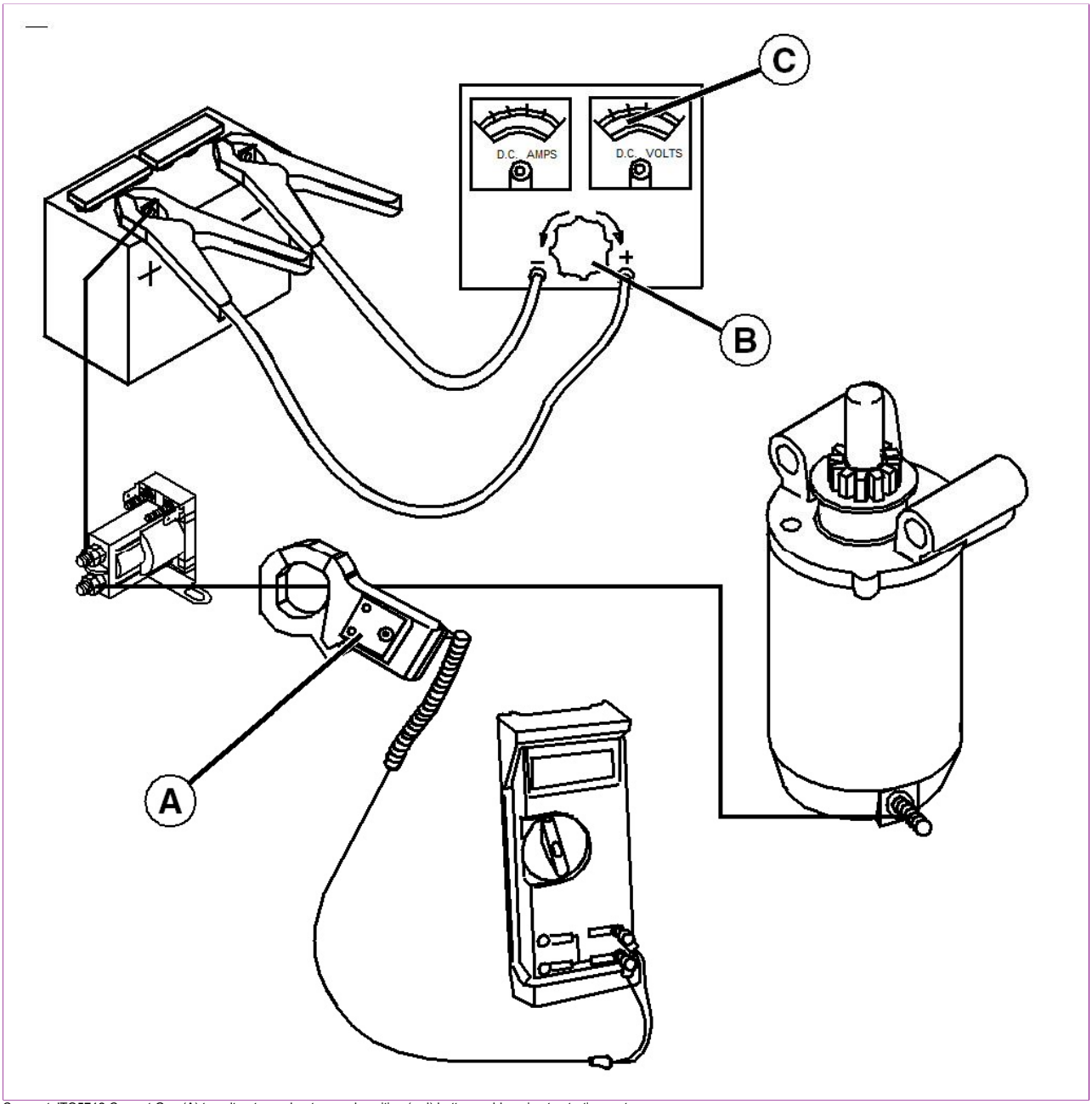
Equipment:

- Multimeter
- JT05712 Current Gun
- JT05685 Battery Tester

Procedure:

1. Park machine on level surface.
2. Turn key switch off.
3. Move Forward/Reverse pedals to neutral position.
4. Engage parking brake.
5. Raise hood.
6. *NOTE:*

   Battery must be in a good state of charge at 12 to 15 VDC.



Connect JTO5712 Current Gun (A) to voltmeter and put around positive (red) battery cable going to starting motor.

7. Set current gun for DC current.
8. **IMPORTANT:**

   Turn load knob fully counterclockwise (out) into OFF position before making any test connections.

   Perform this test quickly to prevent damage to battery tester. Do not apply full load to battery for more than 5 - 10 seconds.

   Connect battery tester to battery.
9. Turn load knob (B) clockwise (in) until voltage on voltage tester scale reads 11 volts for 5 seconds only to partially drain battery.
10. Quickly turn load knob completely counter-clockwise (out) to OFF position.
11. Start and run engine at fast idle. Battery voltage should read between 12.2 - 15.0 VDC.
12. Turn load knob clockwise (in) until voltage on tester voltage scale (B) reads 11 volts and observe reading on amps scale.
13. Quickly turn load knob completely counter-clockwise (out) to OFF position.
14. After load test, voltage scale (B) should return to voltage level prior to test.

Results:

- If reading does not meet specifications, test stator voltage output. See “Stator Output Test” procedure.

  If stator voltage output meets specifications and voltage and ground to the regulator/rectifier is verified, replace the regulator/rectifier.

Item	Measurement	Specification
Specifications - LA105/115/125/135:		

Minimum load reading		3 - 9 amps at 11 volts

Item	Measurement	Specification
Specifications - LA145/165/175:		
Minimum load reading		13.5 amps at 11 volts

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Relay Test

Relay Test

Reason:

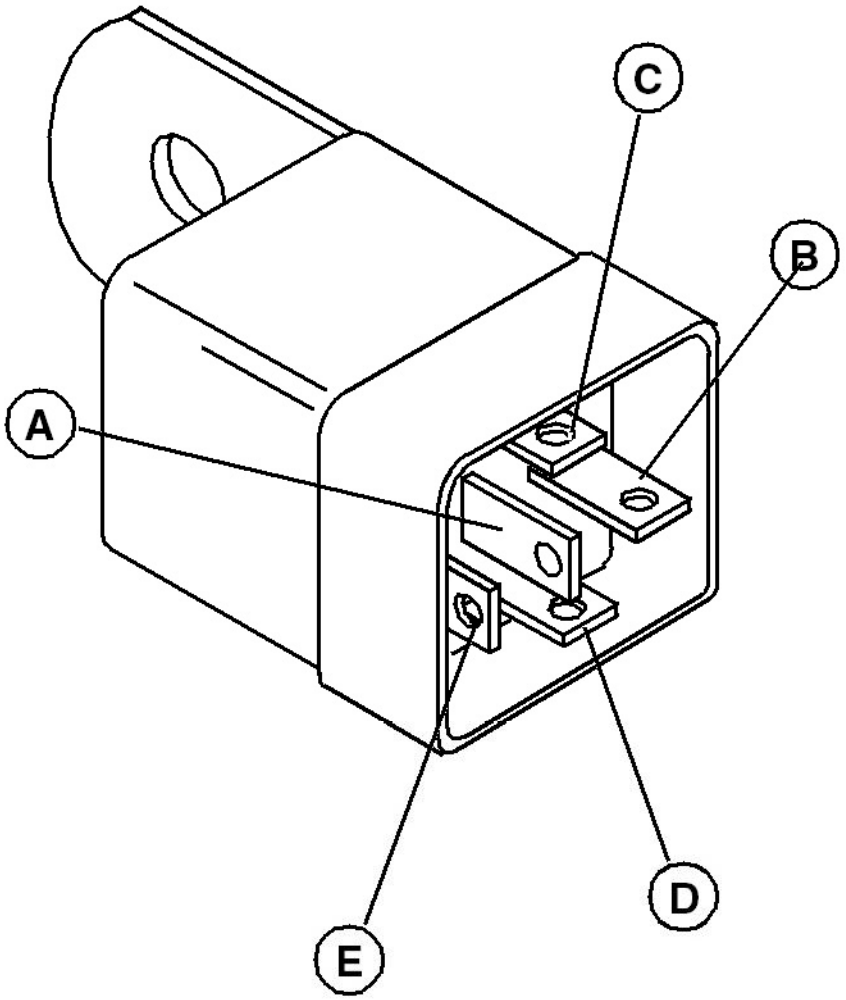
To check relay terminal continuity in the energized and de-energized condition.

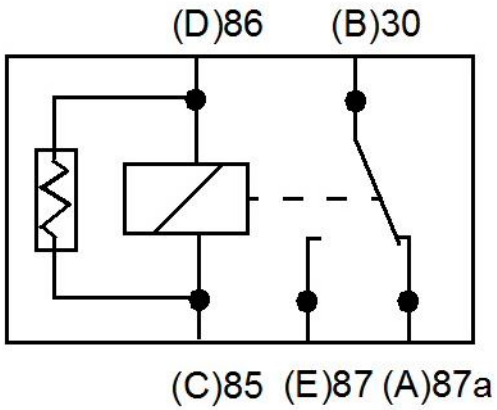
Equipment:

- Ohmmeter or continuity tester

Procedure:

1. Park machine on level surface.
2. Engage park brake.
3. Turn key switch off.
4. Disconnect relay connector.





5. Check terminal continuity using an ohmmeter or continuity tester.
   - There should be continuity between terminals (A) and (B), and between terminals (C) and (D).
   - There should not be continuity between terminals (E) and (B).
6. Connect a jumper wire from battery positive (+) terminal to relay terminal (C). Connect a jumper wire from relay terminal (D) and ground (-).
   - There should be continuity between terminals (E) and (B).
   - If continuity is not correct, replace relay.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Key Switch Test

Key Switch Test

Reason:

To determine proper operation of key switch.

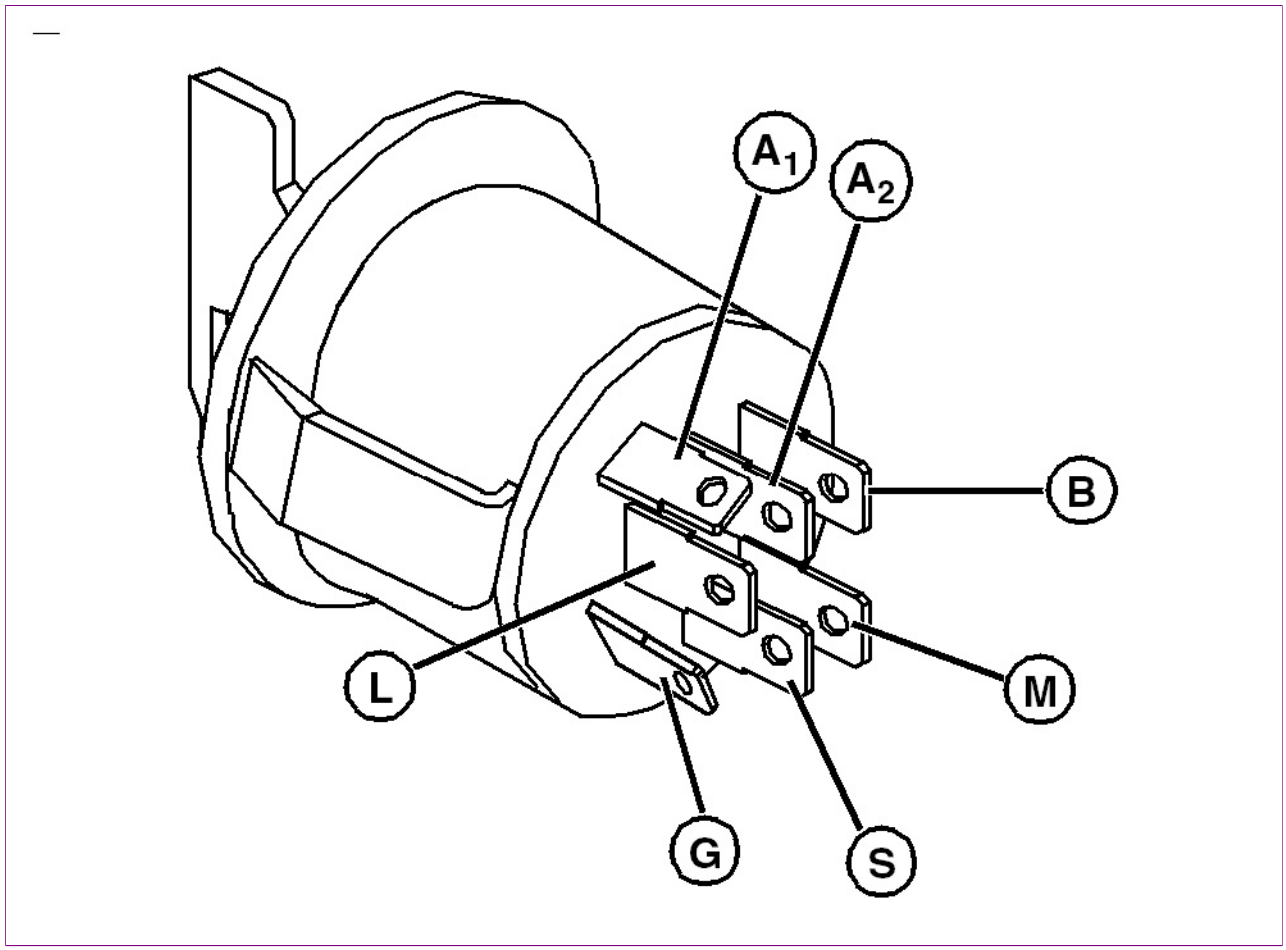
Equipment:

- Ohmmeter

Test Conditions:

- Set ohmmeter for 1X ohms scale.
- Remove connector from back of key switch.

Procedure:



1. Connect meter leads to pairs of switch posts and compare to specifications.
2. For ignition circuit, turn key switch from off to run position.
3. For starting circuit, turn key switch from run to start position.

Results:

- If key switch does not pass all tests, replace switch.

Item	Measurement	Specification
Switch Position Specifications:		
OFF (Stop)		continuity between M, G, and A1
RUN 1 (With Lights)		continuity between B and A1

RUN 1 (With Lights)	continuity between L and A2
RUN 2 (Without Lights)	continuity between B and A1
START	continuity between B, S, and A1

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 PTO/Brake Switch Test

PTO/Brake Switch Test

LA105/115/125/135 (LA145/165/175 - Brake Switch Only)

Reason:

To determine proper operation of the switch used in either the PTO or Brake position.

Equipment:

- Ohmmeter

Test Connections:

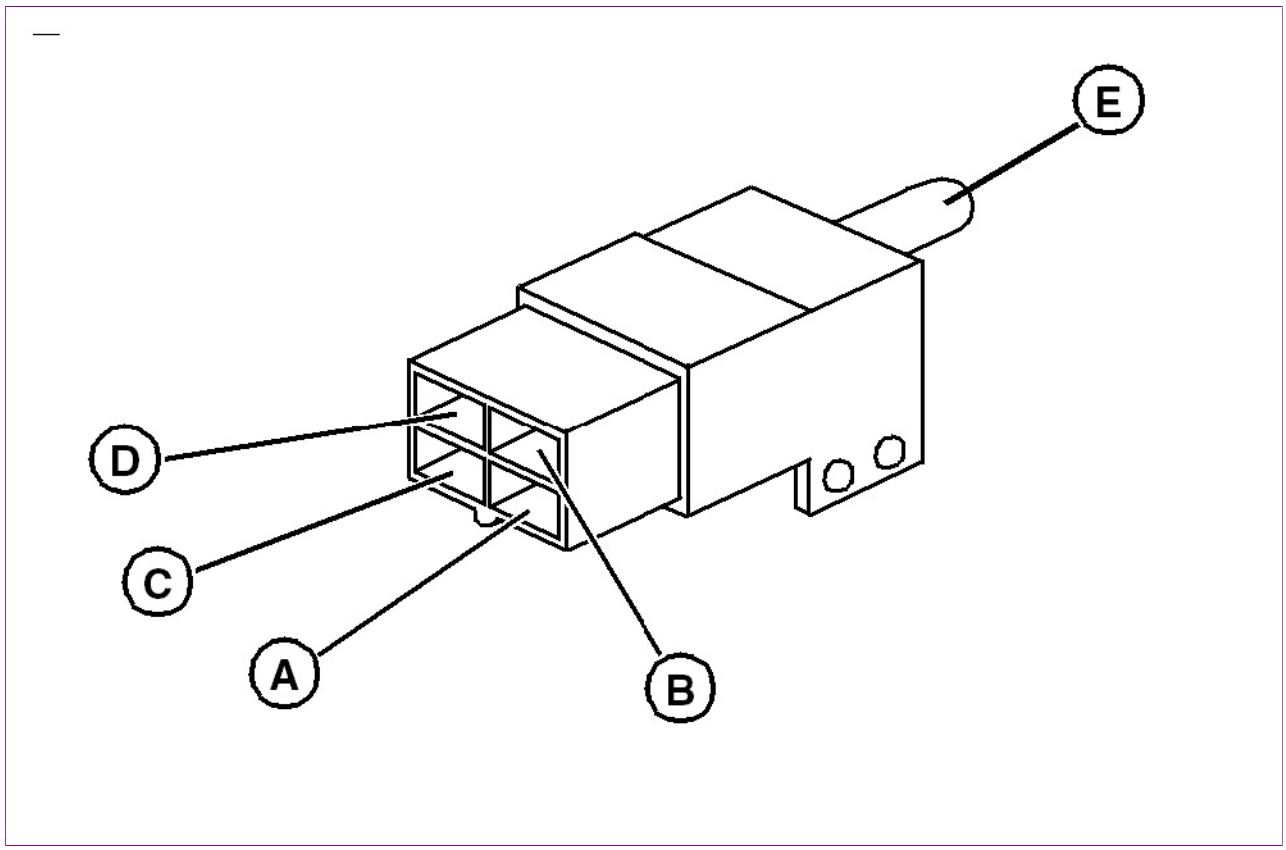
- Set ohmmeter for 1X scale

  NOTE:

  On analog (swing needle) ohmmeters, set zero point before each test.

Procedure:

1. Remove connector from PTO or brake switch. Remove switch if needed to access terminals properly.



2. Connect meter leads to pairs of switch posts and compare to specifications.
3. Press and release plunger (E) of switch.

Results:

- If PTO or brake switch does not pass all tests, replace switch.

Item	Measurement	Specification
Specifications:		
Plunger released		continuity between A and B

Plunger released	no continuity between C and D
Plunger pressed	no continuity between A and B
Plunger pressed	continuity between C and D

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
PTO Switch Test - LA145/155/165/175

PTO Switch Test - LA145/155/165/175

Reason:

To determine proper operation of PTO switch.

Equipment:

- Ohmmeter

Test Connections:

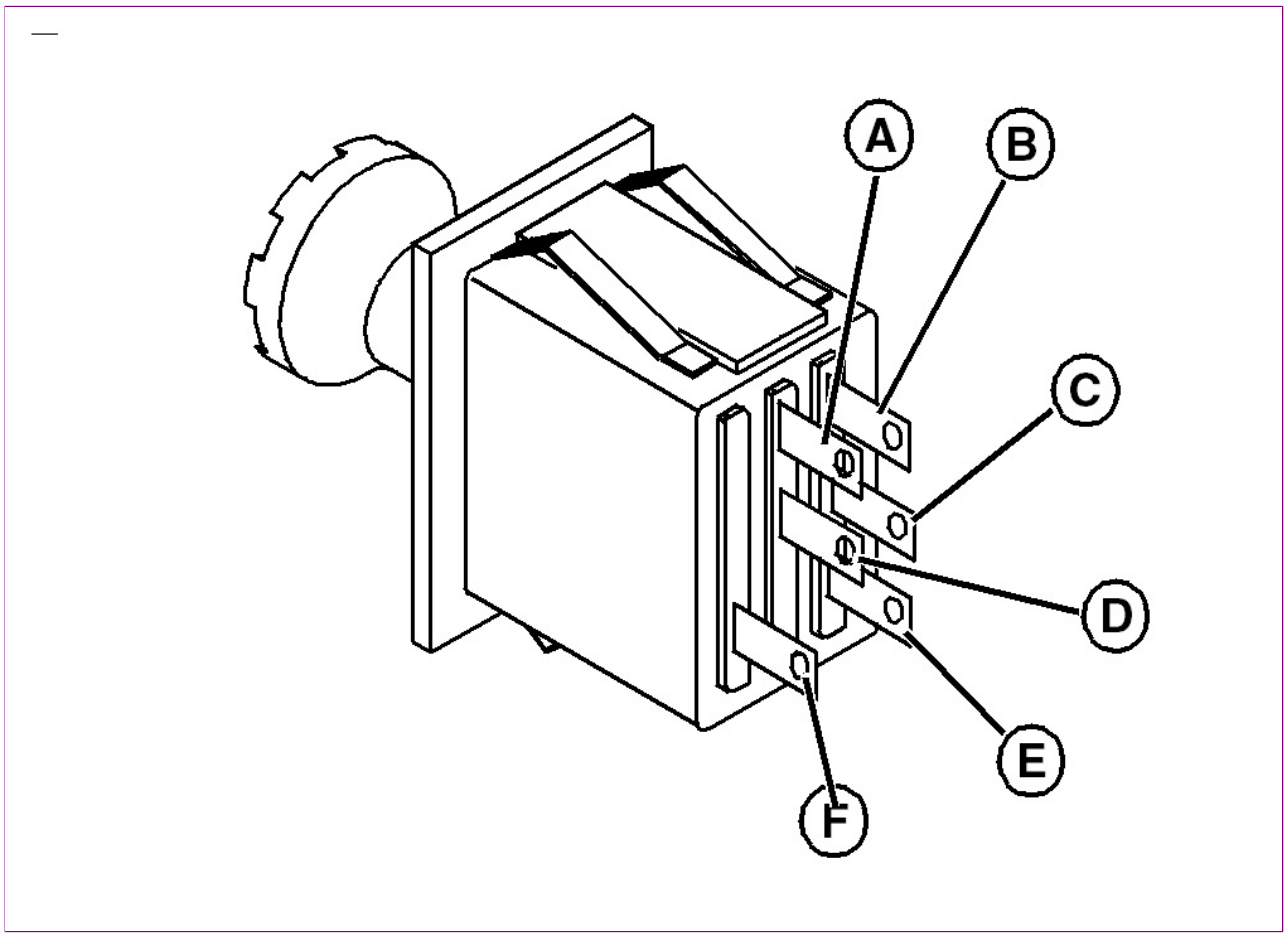
- Set ohmmeter for 1X scale

  NOTE:

  On analog (swing needle) ohmmeters, set zero point before each test.

Procedure:

1. Remove connector from PTO switch.



2. Connect meter leads to pairs of switch posts and compare to specifications.

Results:

NOTE:

When PTO switch is replaced, the new switch may have more pins when substituted. Test switch continuities the same.

- If PTO switch does not pass all tests, replace switch.

Item	Measurement	Specification
Specifications:		
Switch in off position Continuity between terminals		E to F, All other combinations no continuity.
Switch in on position Continuity between terminals		A to B and C to D, All other combinations no continuity.

Electric PTO Clutch Test - LA145/155/165/175

Reason:

To check condition of PTO clutch coil.

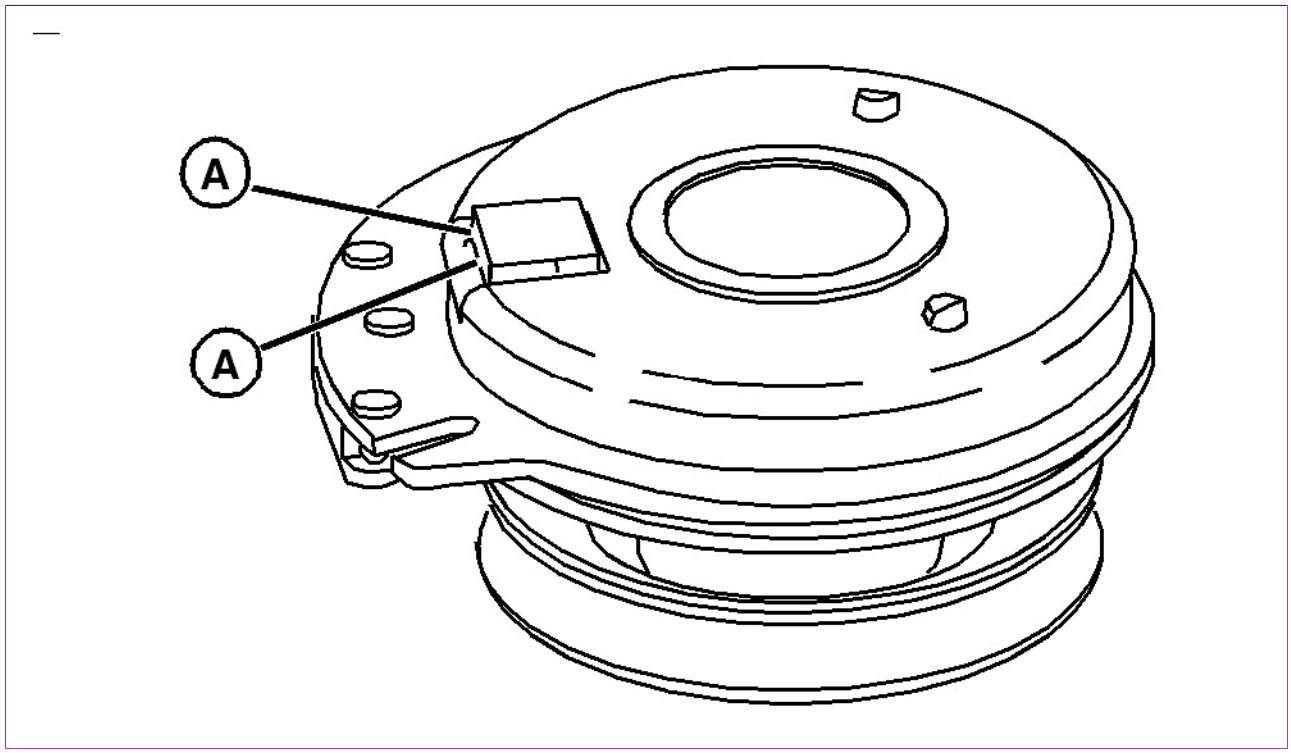
Equipment:

- Ohmmeter
- JT05712 Current Gun

Procedure:

NOTE:

PTO clutch should make an audible click when engaged.

1. Park machine on level surface and turn key switch off.
2. Move Forward/Reverse pedals to neutral position and engage park brake.
3. Remove mower deck. See procedure in the Attachments section.
4. Disconnect PTO clutch connector.
5. Set ohmmeter for 1x ohms scale.
6. 

Measure resistance across PTO clutch terminals (A).
7. Resistance should measure within specification. If resistance is not within specification, replace PTO clutch.
8. Measure resistance from each terminal to ground to check for short circuits. Replace clutch as necessary.

Item	Measurement	Specification
Specification:		
Resistance		3.7 ohms

RIO Switch Test

Reason:

To determine proper operation of the RIO switch.

Equipment:

- Ohmmeter

Test Connections:

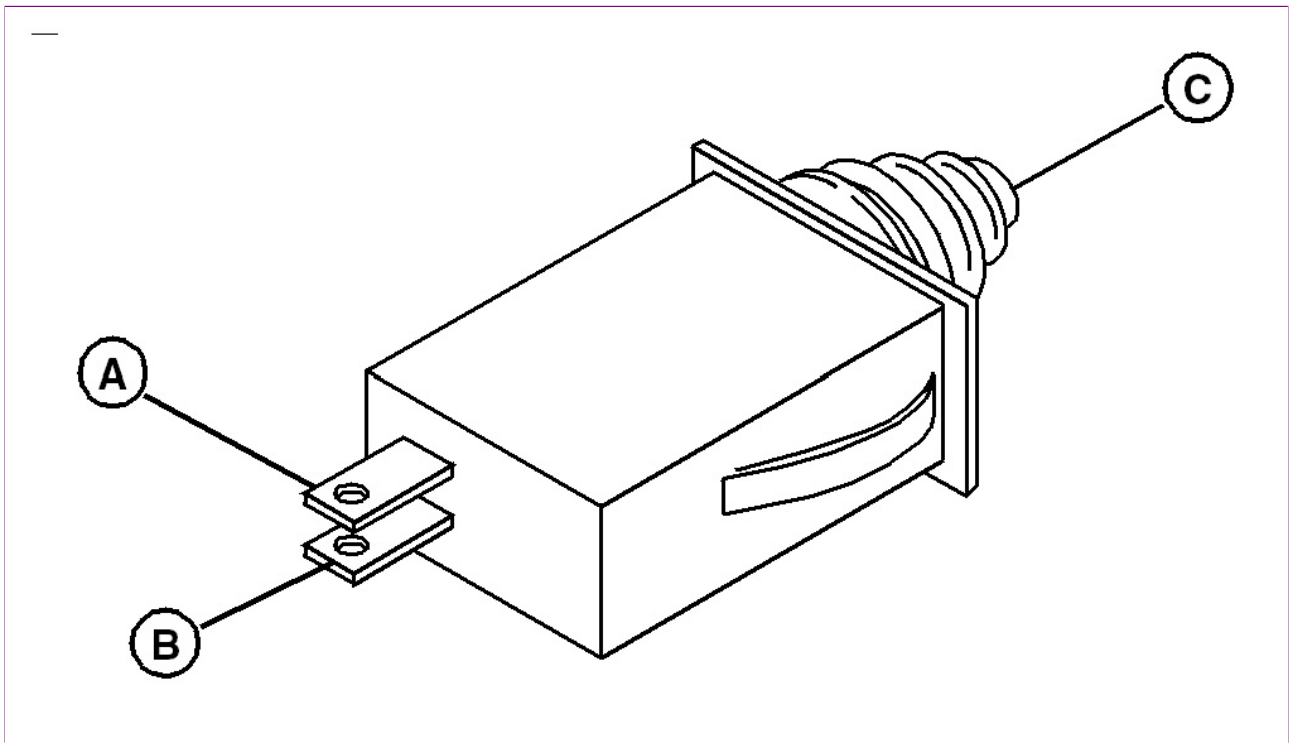
- Set ohmmeter for 1X scale

  NOTE:

  On analog (swing needle) ohmmeters, set zero point before each test.

Procedure:

1. Remove connector from RIO switch. Remove switch if needed to access terminals properly.



2. Connect meter leads to pairs of switch posts and compare to specifications.
3. Press and release plunger (C) of switch.

Results:

- If RIO switch does not pass all tests, replace switch.

Item	Measurement	Specification
Specifications:		
Plunger released		no continuity between A and B
Plunger pressed		continuity between A and B

RIS Switch Test

Reason:

To determine proper operation of the RIS switch.

Equipment:

- Ohmmeter

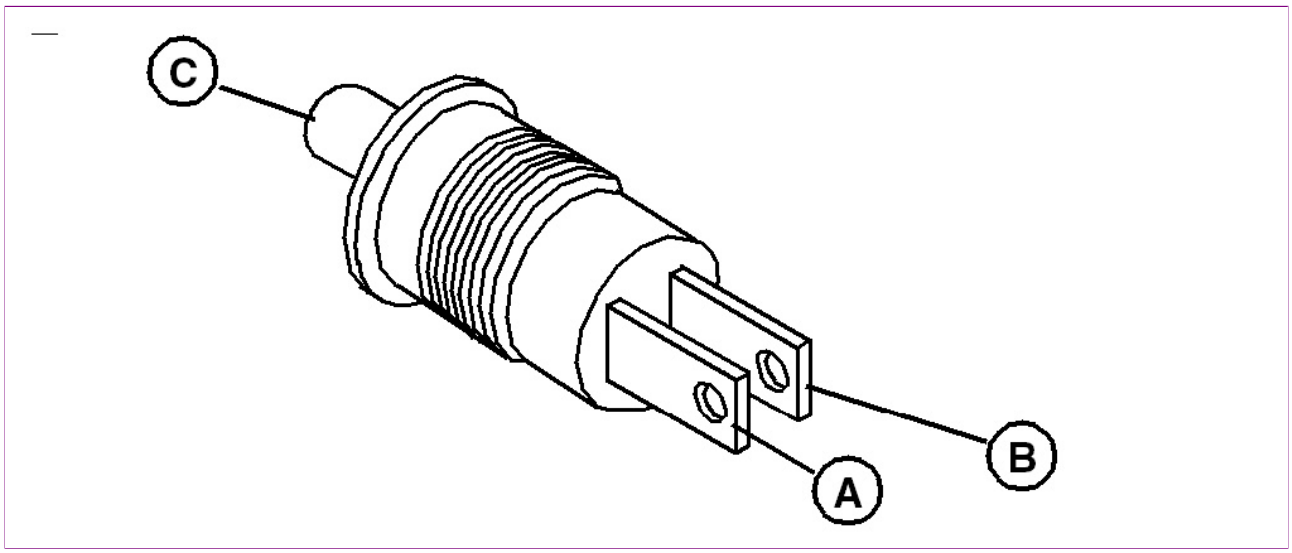
Test Connections:

- Set ohmmeter for 1X scale

  NOTE:

  On analog (swing needle) ohmmeters, set zero point before each test.

Procedure:

1. Remove connector from RIS switch. Remove switch if needed to access terminals properly.
2. 

   Connect meter leads to pairs of switch posts and compare to specifications.
3. Press and release plunger (C) of switch.

Results:

- If RIS switch does not pass all tests, replace switch.

Item	Measurement	Specification
Specifications:		
Plunger released		open between A and B
Plunger pressed		continuity between A and B

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Seat Switch Test

Seat Switch Test

Reason:

To determine proper operation of seat switch.

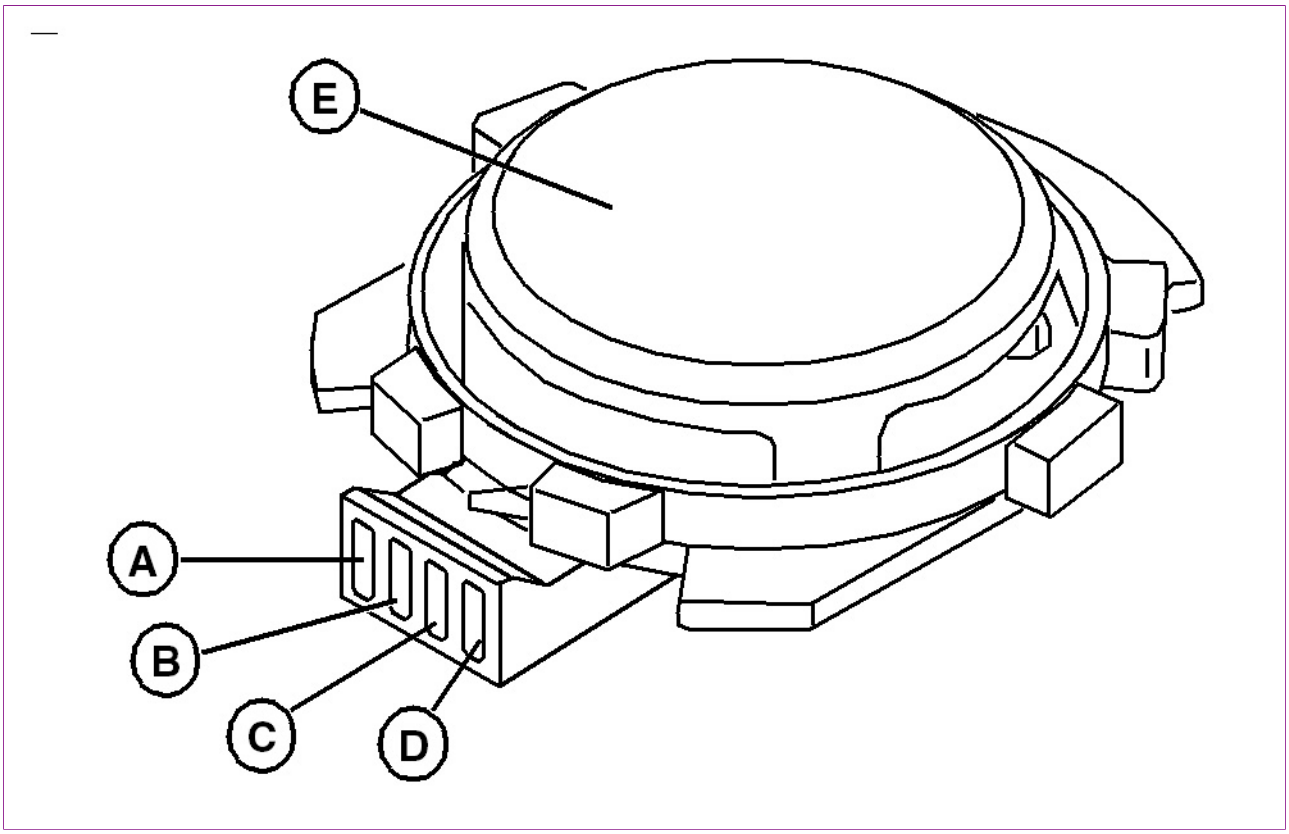
Equipment:

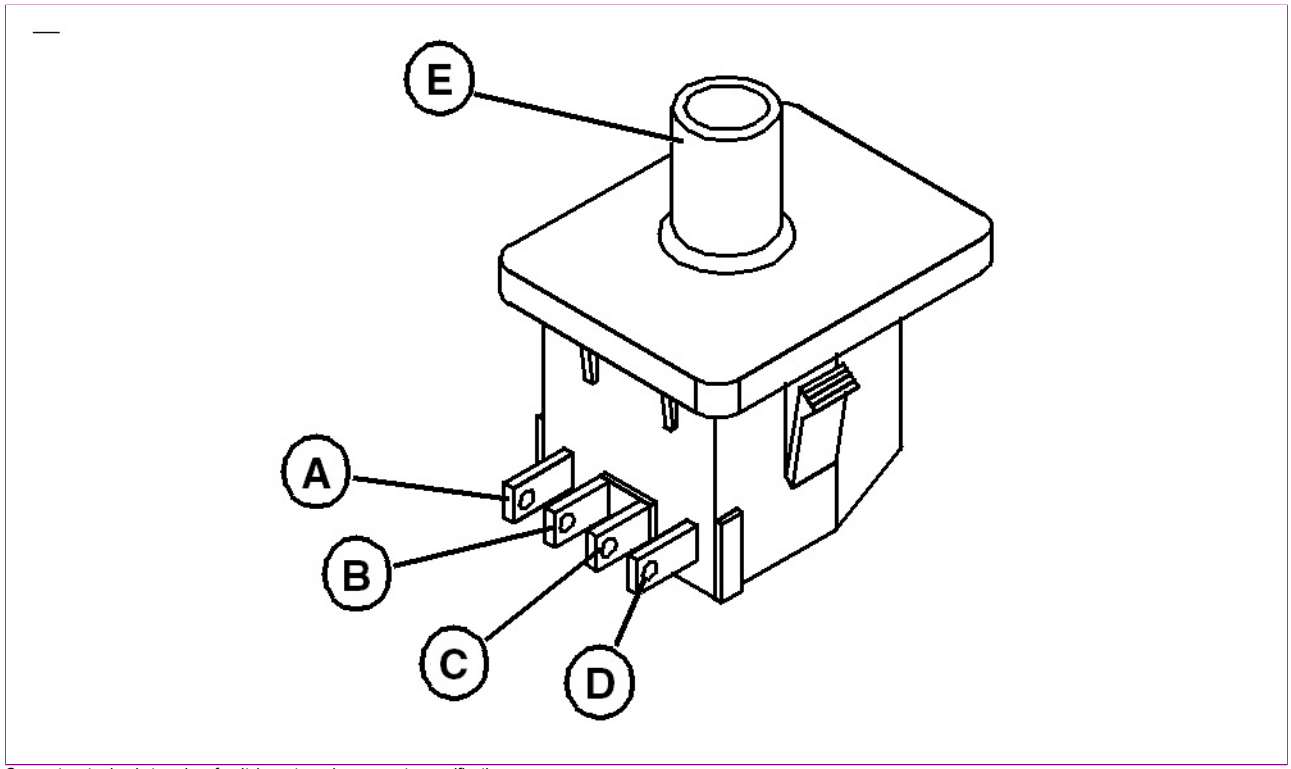
- Ohmmeter

Test Connections:

- Set ohmmeter for 1X ohms scale

Procedure:

1. Remove connector from seat switch.
2. 



Connect meter leads to pairs of switch posts and compare to specifications.

3. Press and release seat switch plunger (E).

Results:

- If the seat switch does not pass tests, replace switch

Item	Measurement	Specification
Specifications:		
Plunger released		continuity between B and C
Plunger released		continuity between A and D
Plunger pressed		open between any terminals

Diode Test - Ignition Coils

Reason:

To verify correct function of diodes in engine stop circuit. If a diode fails "open", the cylinder with the open diode will continue to run when the engine is shut off. If a diode fails "short", the cylinder with the shorted diode will not run (no spark).

Equipment:

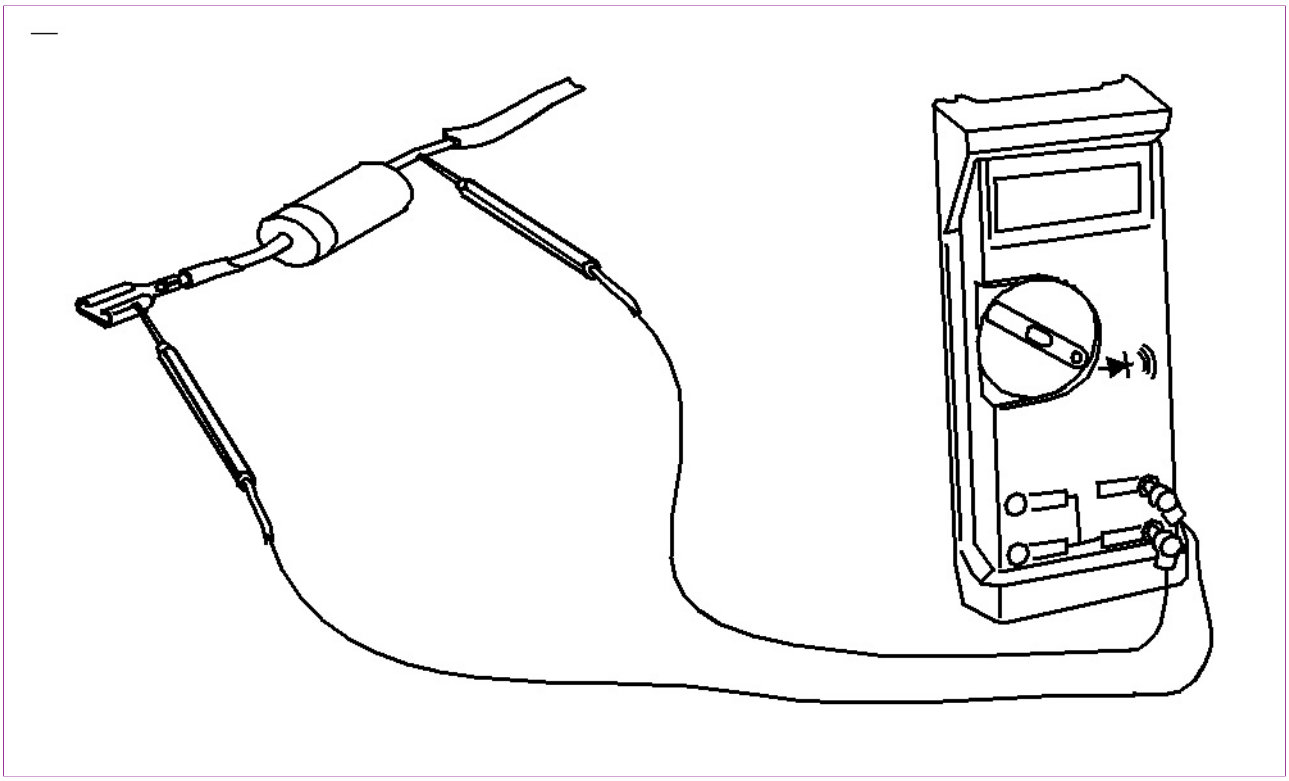
- Ohmmeter

Procedure:

1. Park machine safely with park brake locked.
2. Remove engine blower housing.
3. Disconnect diode grounding wire from ignition coil.
4. *NOTE:*

   The meter will measure and display voltage drop across diode when set to diode test range.

   Set meter to diode test range.

5. Place one meter lead on connector and second meter lead on opposite side of diode.
6. Reverse position of meter leads and retest.

   NOTE:

   If using ohmmeter for test, resistance in one direction will be approximately 80,000 ohms, and reading will "fall" during testing. Ohmmeter reading in opposite direction will be between 4 and 5 mega-ohms and "rise" during testing.

Results:

- Meter should "beep" once in one meter lead position only.
- Meter has continuous tone in either position, diode is shorted, replace diode.
- Meter displays "OL" in both positions, diode is "open", replace diode.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Spark Test

Spark Test

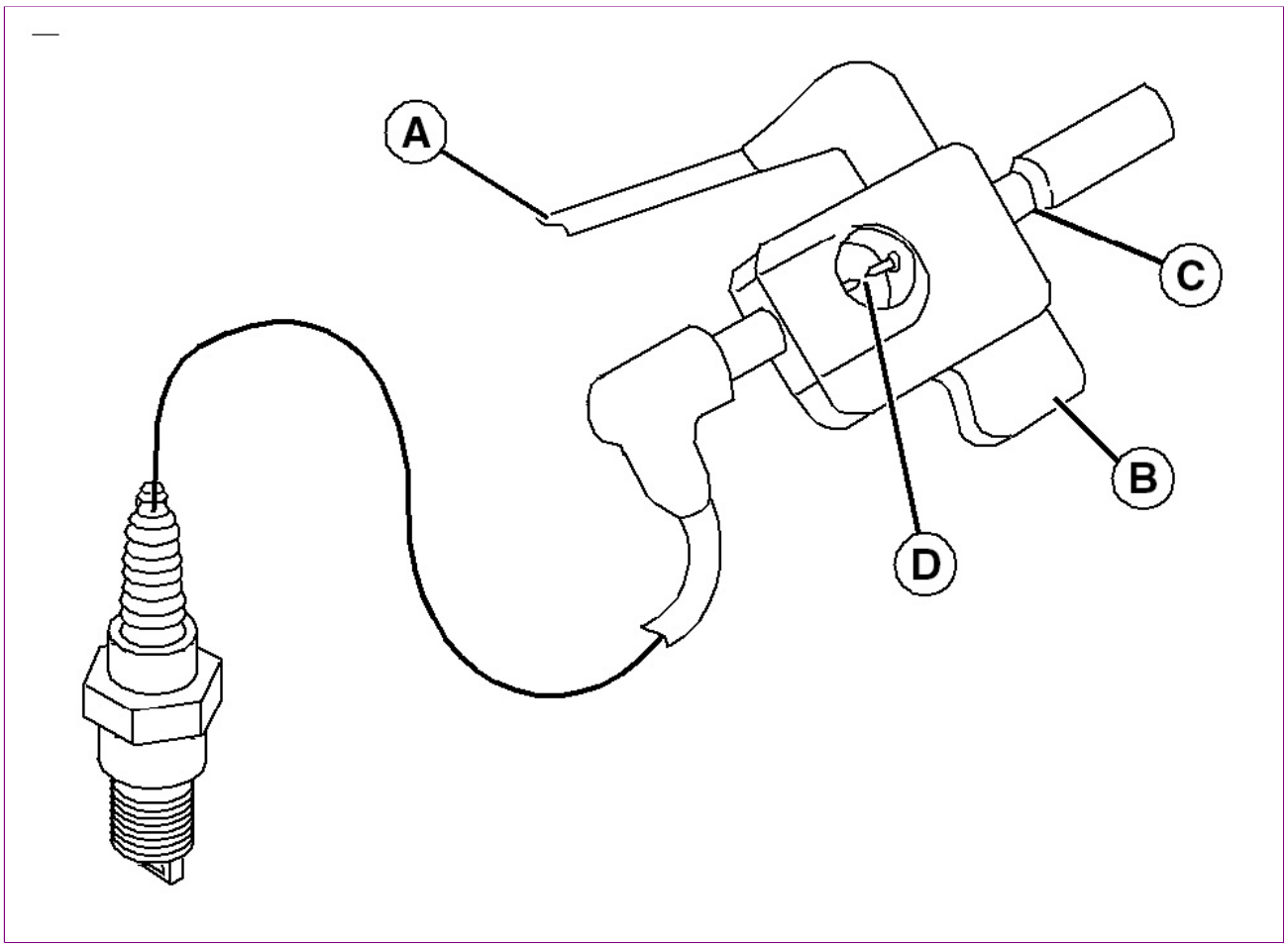
Reason:

Check overall condition of ignition system.

Equipment:

- D-05351ST Spark Tester

Connections:

1. Park machine Safely with park brake locked. See “Parking Safely” in the Safety section.
2. Raise hood.
3. 

Remove high tension lead (A) from spark plug and connect to spark tester (B).
4. Connect spark tester to spark plug.
5. Adjust spark tester gap to 4.2 mm (0.166 in.) with screw (C).

IMPORTANT:

Do not adjust spark tester gap beyond 5.0 mm (0.200 in.) (5 turns), as damage to ignition components could occur.

Procedure:

1. Turn key switch to start position and watch spark (D) at spark tester. If engine will start, watch spark with engine running.

Specifications:

- Steady, strong, blue spark.

Results:

- If spark is weak, or if no spark, install a new spark plug and test again.
- If spark is still weak, or still no spark, run tests on individual components to find cause of malfunction.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Fuel Shutoff Solenoid Test

Fuel Shutoff Solenoid Test

Reason:

To determine if the fuel shutoff plunger retracts when the solenoid is energized.

Equipment:

- 2 Jumper wires

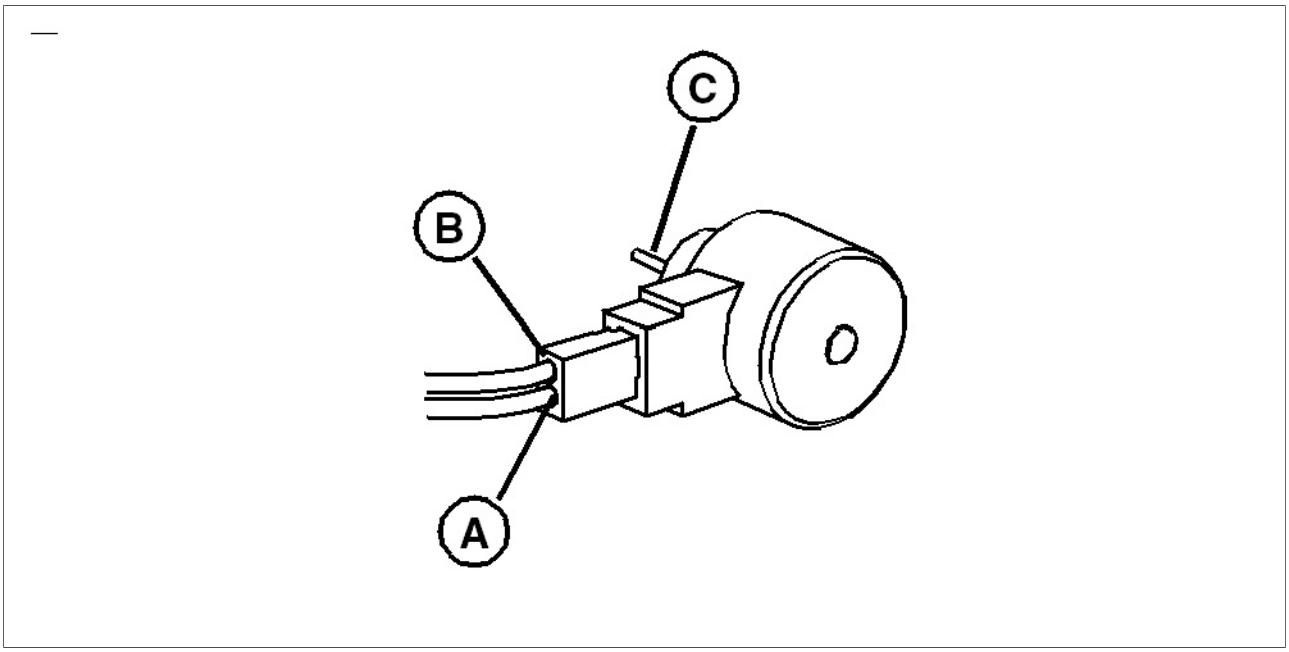
Procedure:

CAUTION:

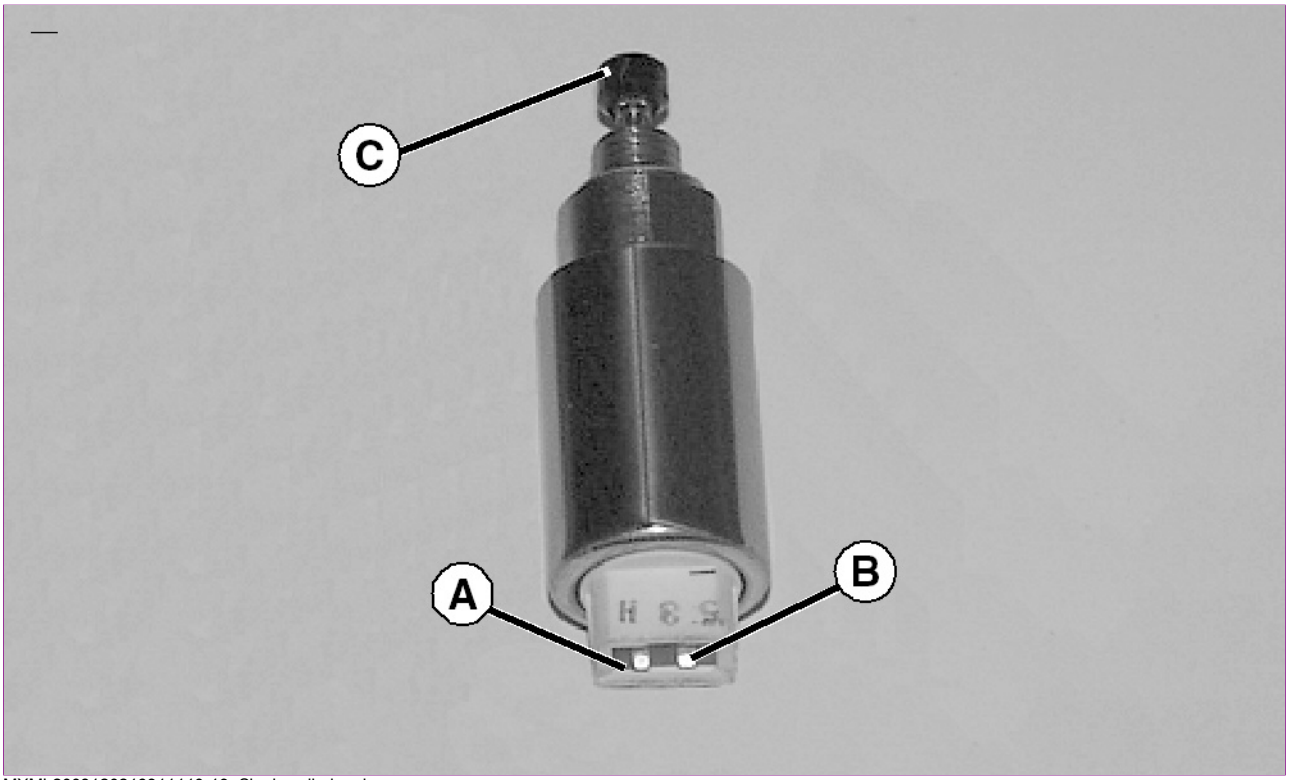
Fuel vapors are explosive and flammable:

- ***Do not smoke while handling fuel.***
- ***Keep fuel away from flames or sparks.***
- ***Shut off engine before servicing.***
- ***Cool engine before servicing.***
- ***Work in a well-ventilated area.***
- ***Clean up spilled fuel immediately.***

1. Disconnect fuel shutoff solenoid connector.
2. Remove fuel shutoff solenoid and washer from carburetor.
3. —



MXML2008120216311109-UN: V-Twin shown



MXML2008120216311110-19: Single cylinder shown

Connect one of the jumper wires to one terminal of a 12 volt battery and the other jumper wire to the other terminal.

4. Connect the other end of one jumper wire to solenoid terminal (A) and the other jumper to terminal (B). Plunger (C) should now retract with the solenoid energized.
5. Remove jumper wire from one terminal. Plunger should extend.

Results:

- If plunger does not move, replace solenoid.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Hour Meter/Service Indicator Test

Hour Meter/Service Indicator Test

Reason:

To verify that the hour meter/service indicator is functioning properly.

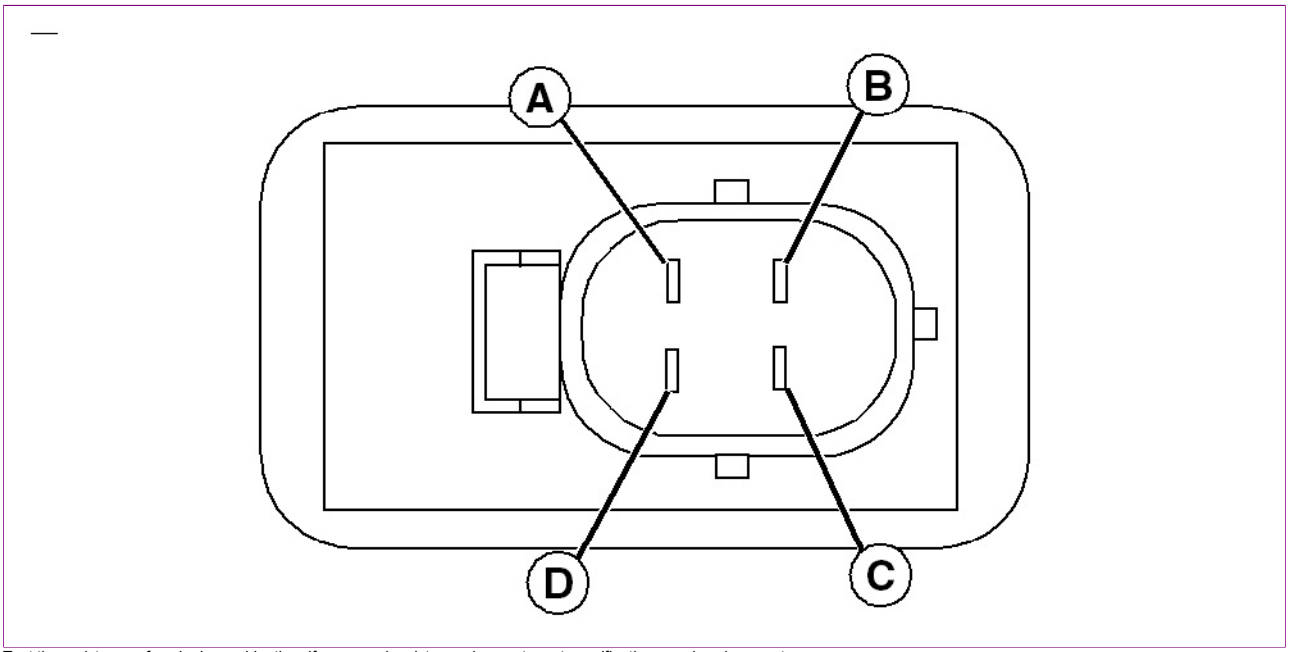
Equipment:

- Ohmmeter

Procedure:

1. Remove hour meter from machine.
2.

	A+	B+	C+	D+
A-		6.06M	9.90K	6.06M
B-	OL		OL	0.01
C-	9.9K	6.02M		6.02
D-	OL	0.01	OL	



Test the resistance of each pin combination. If measured resistance does not meet specifications, replace hour meter.
- A - Black to Ground
- B - Yellow to Fuel Solenoid
- C - White to Ignition
- D - Yellow to Fuse Block

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Armature Air Gap Adjustment

Armature Air Gap Adjustment

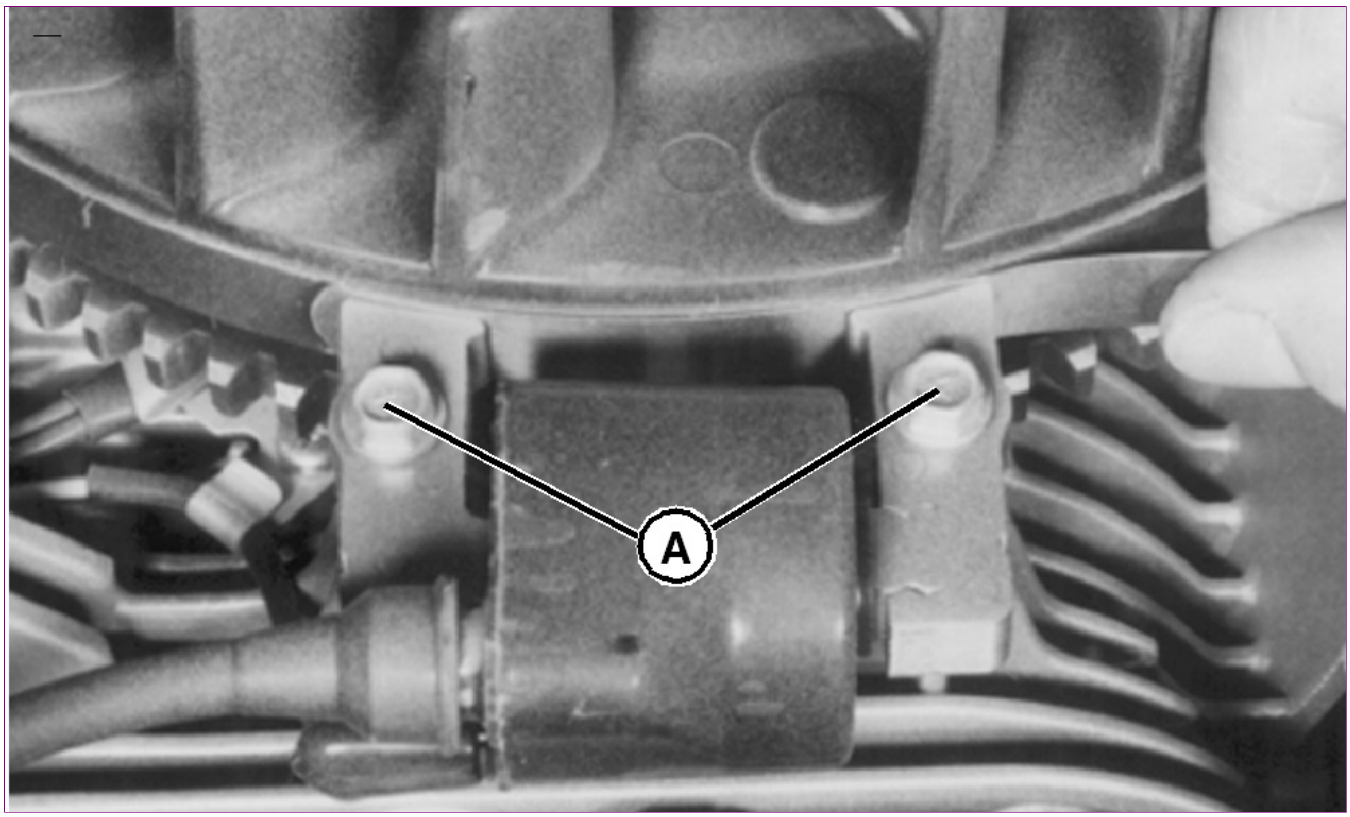
Reason:

To set the proper air gap between the ignition coil armature and the flywheel magnet.

Equipment:

- Thickness gauge 0.20 - 0.30 mm (0.008 - 0.012 in.)

Procedure:



1. Center flywheel magnet under armature.
2. Insert a feeler gauge between flywheel and armature. See specifications below.
3. Push armature against flywheel and tighten screws (A) to **7.8 N•m (69 lb-in.)** .
4. Turn flywheel to remove feeler gauge.
5. Repeat procedure for second armature on two cylinder models.

Item	Measurement	Specification
Specifications:		
Gap		0.20 - 0.30 mm 0.008 - 0.012 in.)
Armature Screws		7.8 N•m 69 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
General Specifications

General Specifications

Item	Measurement	Specification
Type:		
Type		Dana 4360 Gear Transaxle
Dimensions		
Overall Axle Width (End-to-end)		782.96 mm 30.825 in.)
Overall Case Width		541.3 mm 21.31 in.)
Overall Case Length (Front-to-rear)		272.03 mm 10.71 in.)
Overall Height (Top Of Input Shaft-to-bottom Case)		183.40 mm 7.22 in.)
Overall Case Height (Top Case-to-bottom Case)		154.18 mm 6.070 in.)

Item	Measurement	Specification
Lubrication		
Capacity (Multipurpose Grease)		638 g 1.396 lbs)
Overall Weight (With Grease)		14.2 kg 31.2 lbs)

Item	Measurement	Specification
Rear Axle Loading:		
Maximum		204 kg 450 lbs)

Item	Measurement	Specification
Gear Range Speeds		
1st		2.4 km/h 1.5 mph)
2nd		3.2 km/h 2.0 mph)
3rd		5.0 km/h 3.1 mph)

4th	6.4 km/h 4.0 mph)
5th	8.0 km/h 5.0 mph)
Reverse	3.7 km/h 2.3 mph)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Torque Specifications

Torque Specifications

Item	Measurement	Specification
Specifications:		
Gear Shift Arm to Transaxle Cap Screw		16 N•m 140 lb-in.)
Shift Link To Shift Lever Nut		16 N•m 140 lb-in.)
Jacksheave/Crank		75 N•m 55 lb-ft)
Transaxle Mounting Cap Screws to Hanger Bracket (Front)		27 N•m 20 lb-ft)
Transaxle Mounting Cap Screws Hangers to Frame (Front)		34 N•m 25 lb-ft)
Transaxle Mounting Cap Screws to Frame (Rear)		34 N•m 25 lb-ft)
Idler Pulley Nuts to Idler Arm Bracket		54 N•m 40 lb-ft)
Brake Assembly Screws (2)		20 N•m 180 lb-in.)

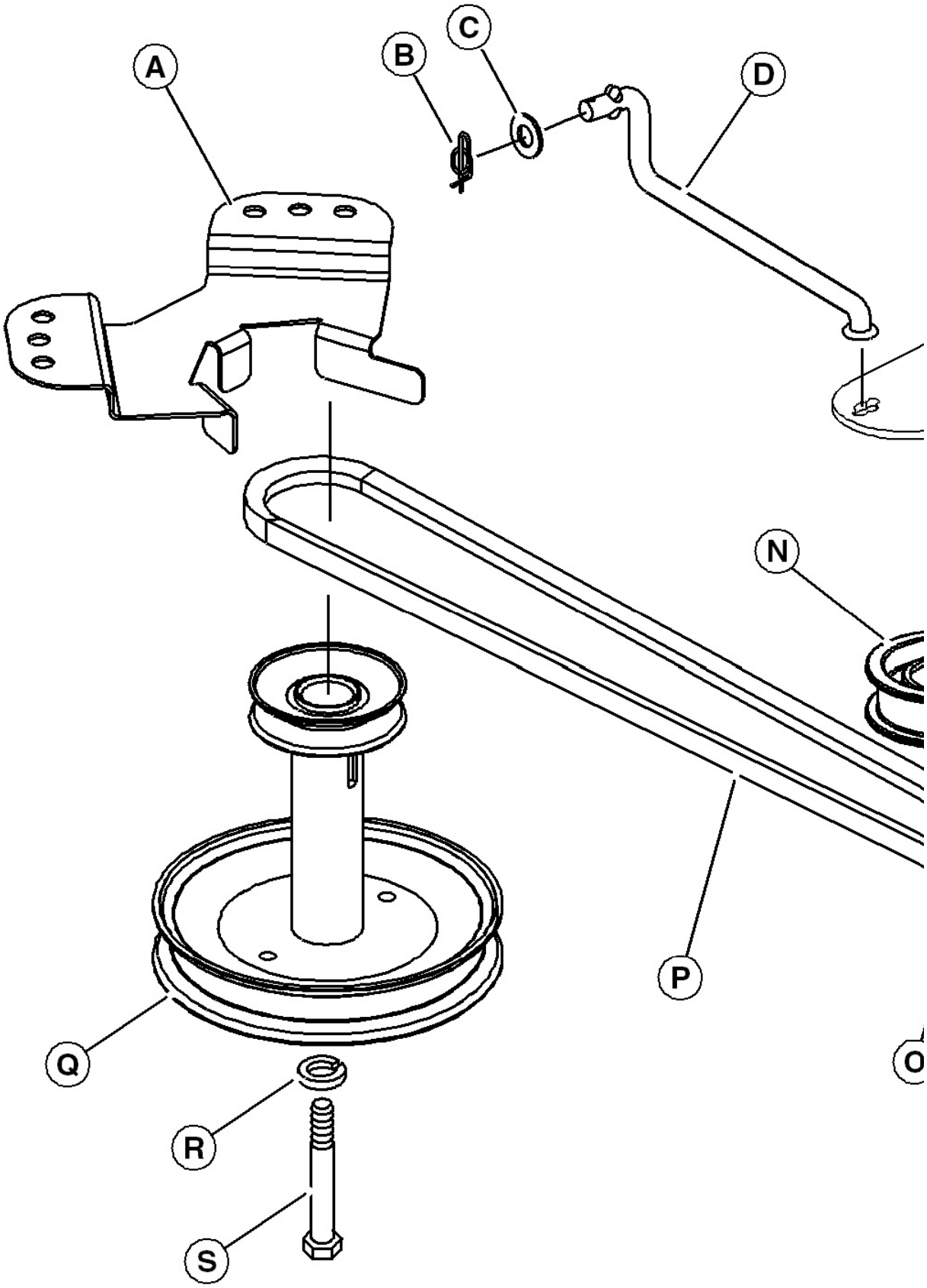
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Other Materials

Other Materials

Number	Name	Use
PM38655LOCTITE 515 Canada PM38625 (U.S.)	Flexible Sealant	Seal transaxle case mating surfaces

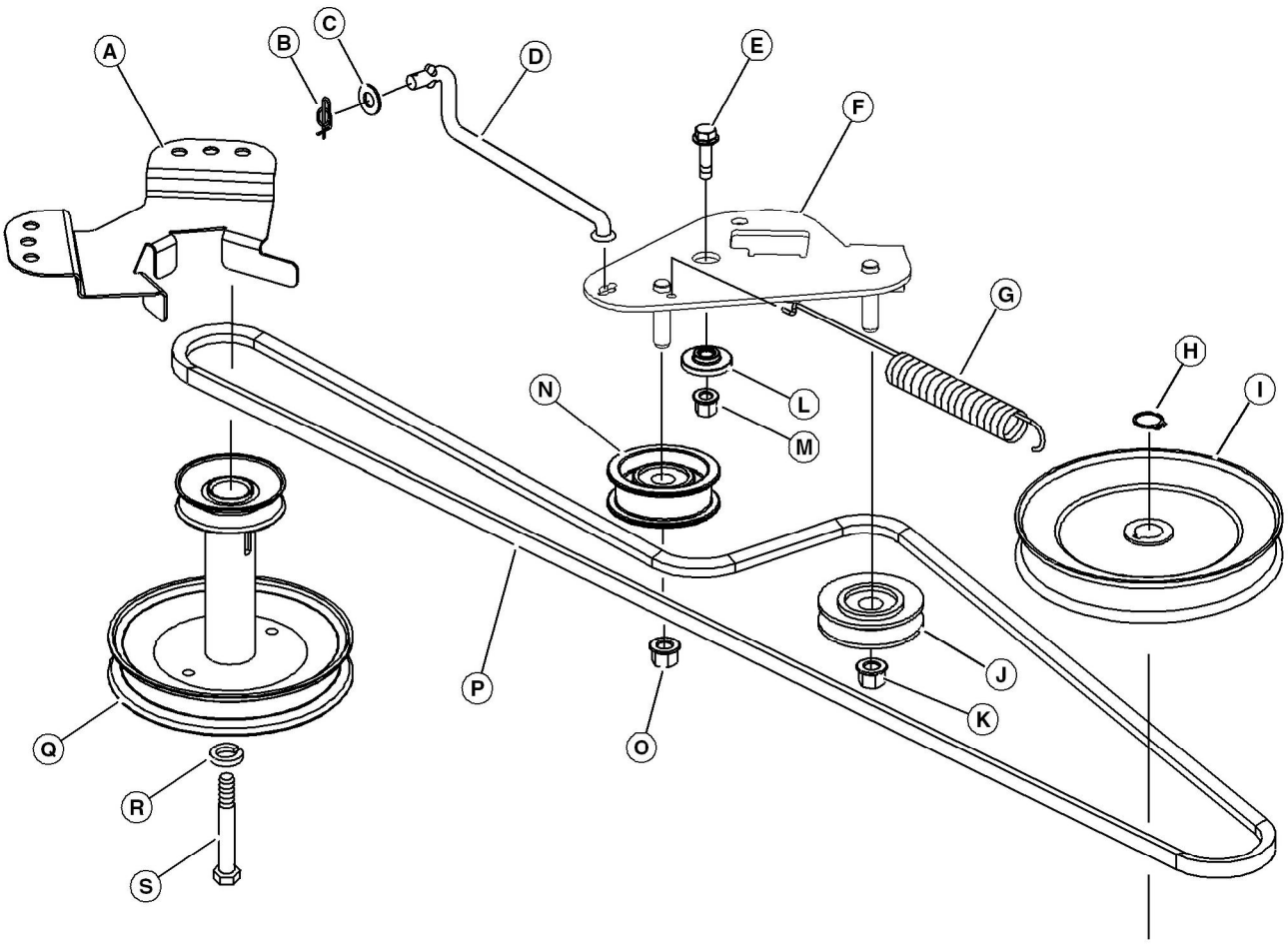
LOCTITE is a registered trademark of the Loctite Corp.

Drive Components

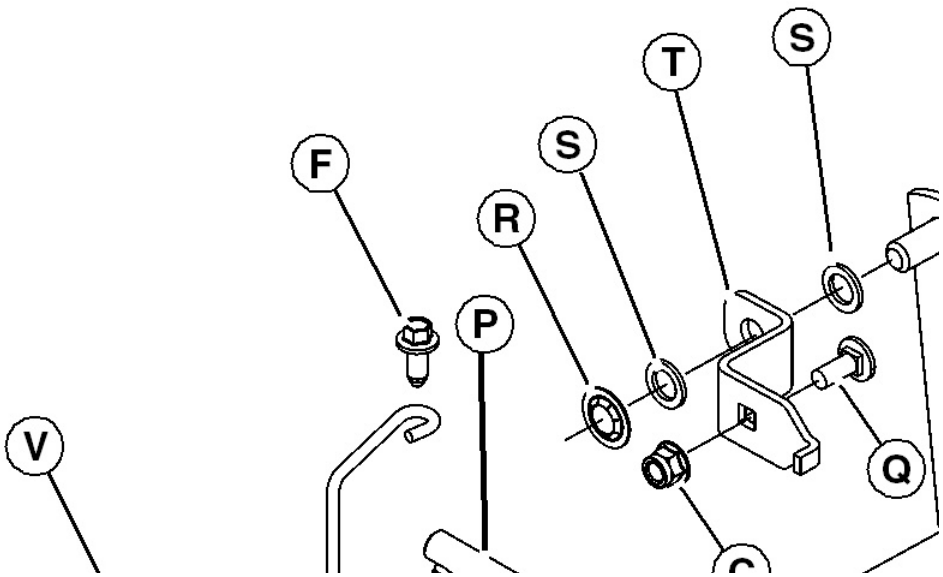

A
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LEGEND:

A - Belt Guide
B - Spring Clip
C - Washer
D - Brake Rod
E - Bolt
F - Idler Arm Bracket
G - Extension Spring
H - E-Ring
I - Transaxle Flat Idler
J - V-Idler
K - Lock Nut
L - Bushing
M - Lock Nut
N - Flat Idler
O - Lock Nut
P - Drive Belt
Q - Engine Drive Sheave Assembly
R - Lock Washer
S - Cap Screw

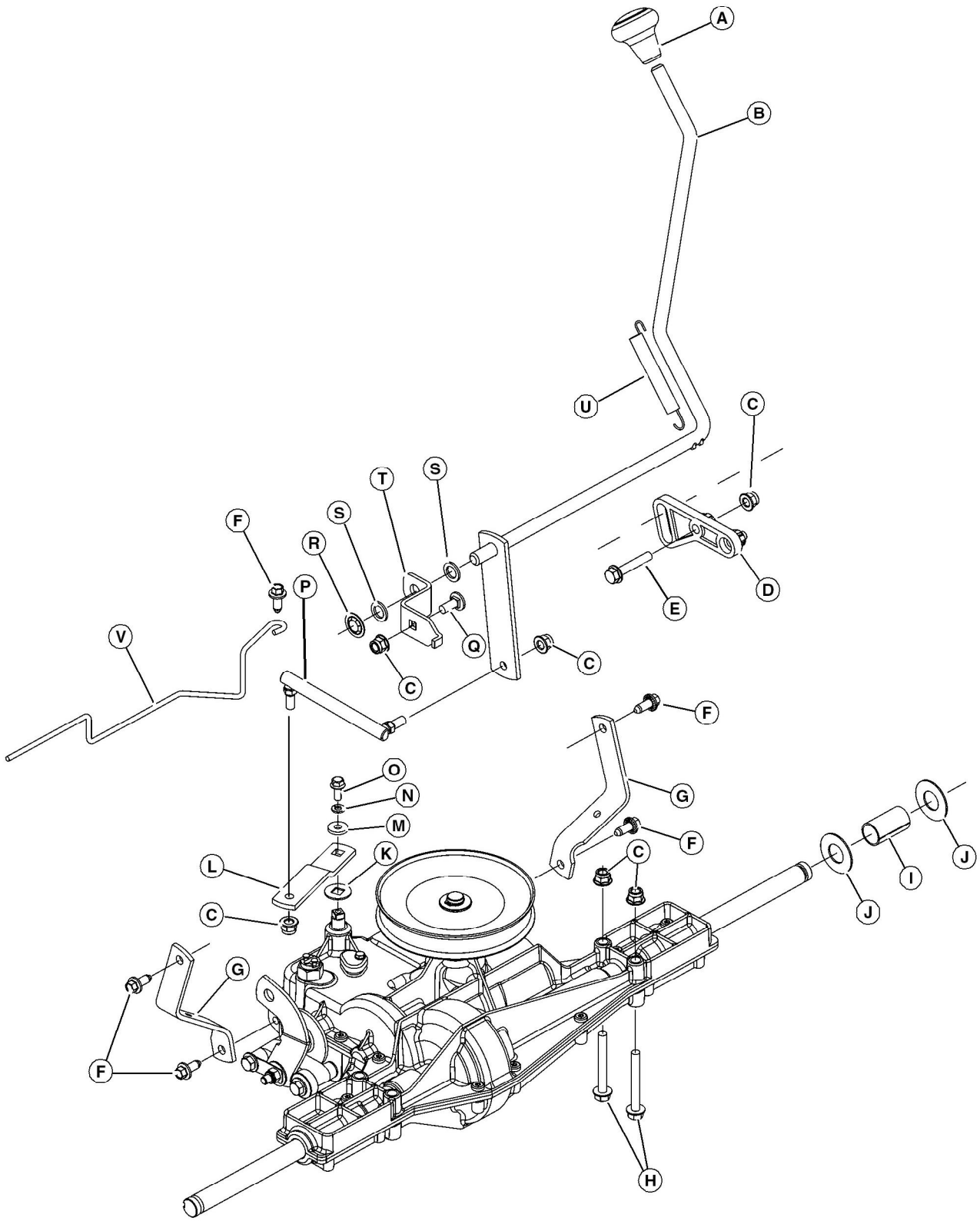

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Forward and Reverse Drive and Linkage

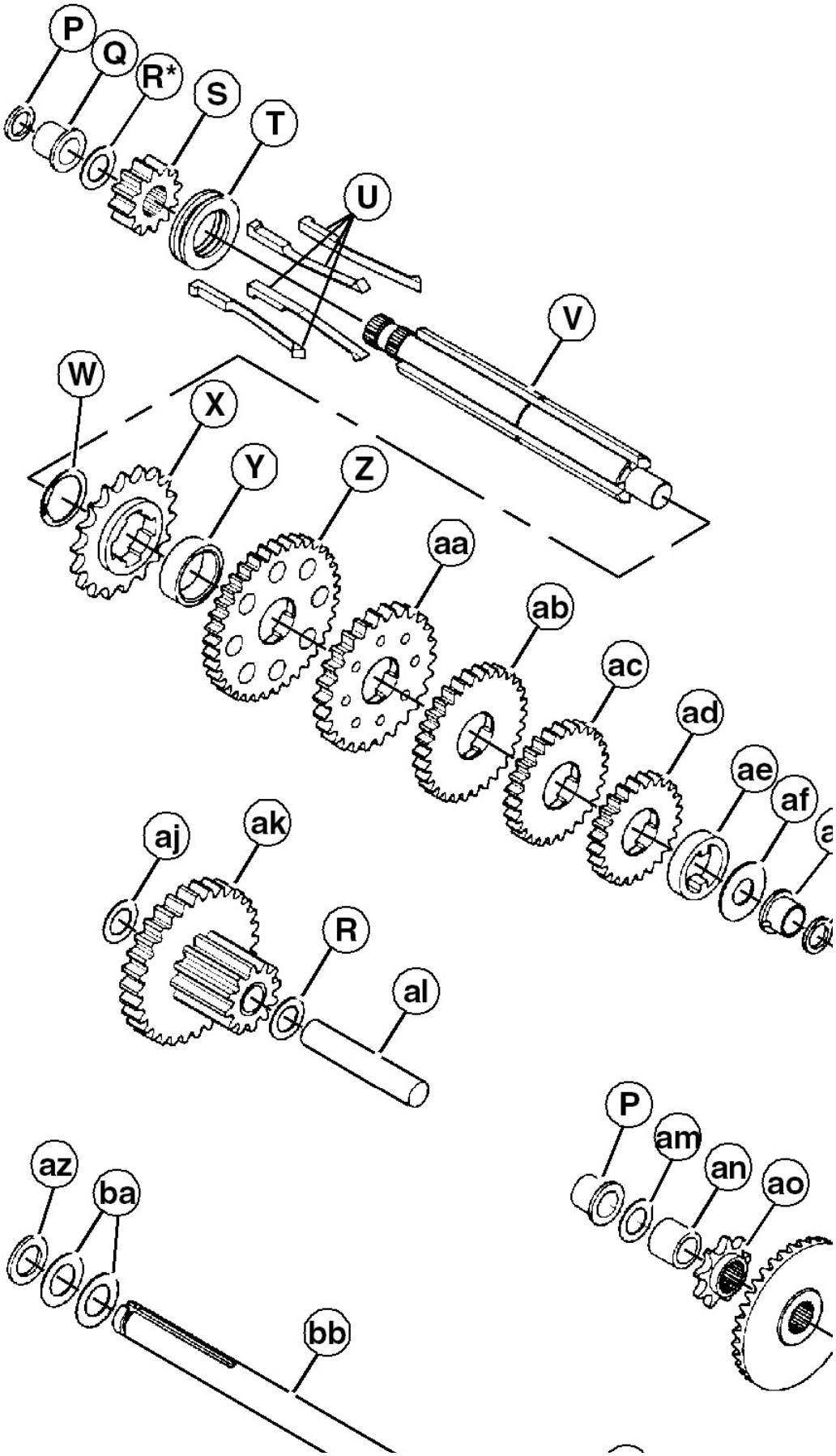

V
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LEGEND:

A - Knob
B - Gearshift Lever
C - Lock Nut (8 used)
D - Shifter Bearing
E - Screw
F - Screw
G - Torque Strap
H - Bolt
I - Spacer (2 used)
J - Thrust Washer (4 used)
K - Washer
L - Shift Arm
M - Washer
N - Lock Washer
O - Cap Screw
P - Ball Joint Link
Q - Bolt
R - Push Nut
S - Washer
T - Support Bracket
U - Shift Lever Extension Spring
V - Belt Guard

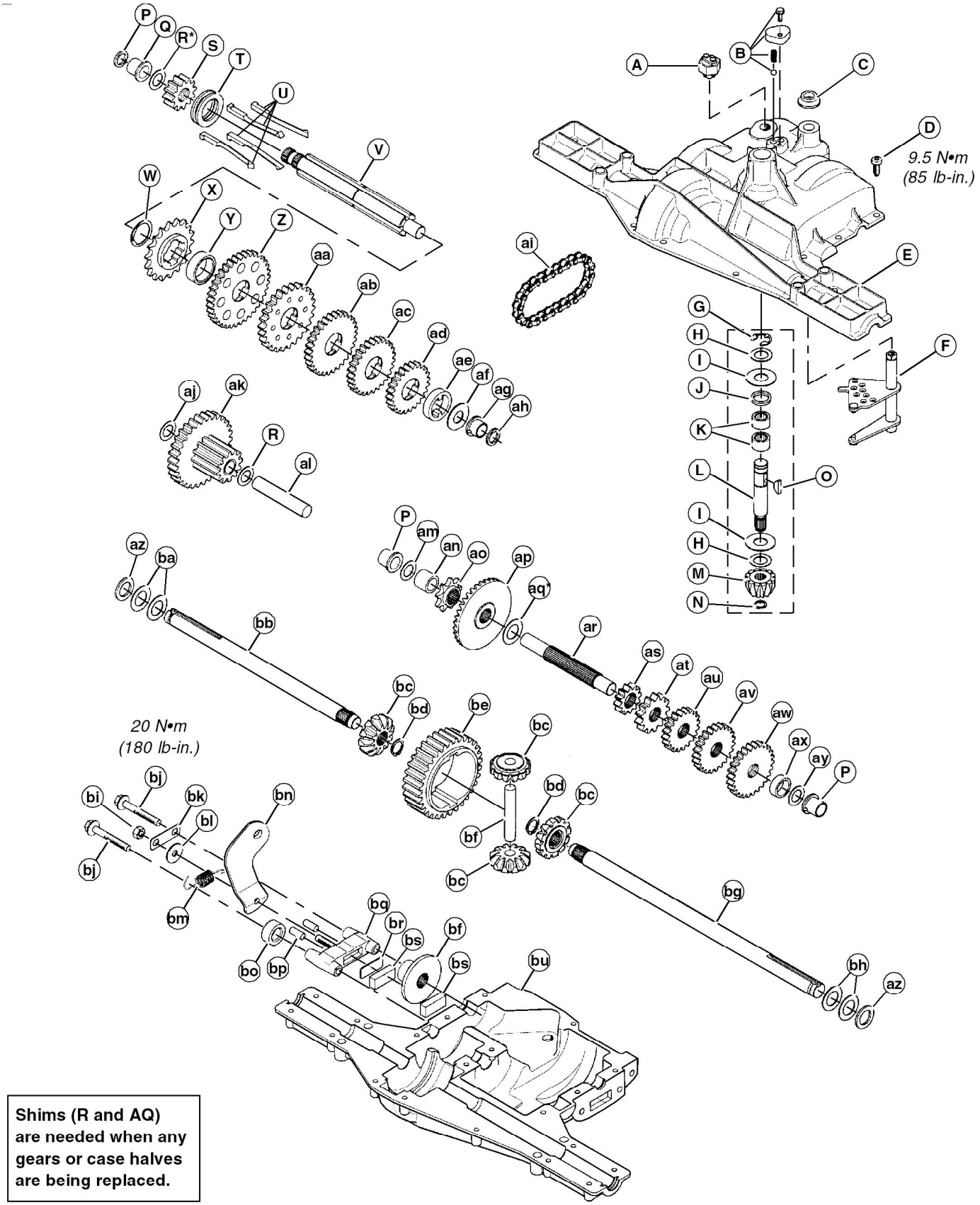

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Transaxle Components


P
Q
R*
S
T
U
V
W
X
Y
Z
aa
ab
ac
ad
ae
af
aj
ak
R
al
az
ba
bb
P
am
an
ao

LEGEND:

A - Neutral Switch
B - Detent (Kit)
C - V-Ring Seal
D - Screw (16 used)
E - Case
F - Shifter
G - Snap Ring
H - Shims (Kit)1
I - Washer, 0.632x1.0x0.046 (2 used)
J - Spacer
K - Bearing (2 used)
L - Input Drive Shaft
M - Pinion Gear
N - Snap Ring
O - Key
P - Seal
Q - Bearing (3 used)
R - Shim (Kit)Shims H, R and AQ used when gears, input shaft assembly, or transaxle case are replaced.
S - Spur Gear
T - Shift Collar
U - Clutch Keys (Kit)
V - Intermediate/Brake Shaft
W - Retaining Ring
X - Drive Chain Sprocket (Kit)
Y - Spacer, 1.131x1.45x0.494
Z - Gear, 1st - 37 teeth (with AS - 12 teeth)
AA - Gear, 2nd - 26 teeth (with AT - 13 teeth)
AB - Gear, 3rd - 30 teeth (with AU - 20 teeth)
AC - Gear, 4th - 27 teeth (with AV - 23 teeth)
AD - Gear, 5th - 24 teeth (with AW - 26 teeth)
AE - Spacer (with internal keys)
AF - Washer, 0.640x1.38x0.061
AG - Flange Bearing
AH - Lip Seal
AI - Drive Chain (Kit)
AJ - Washer, 0.632x1.0x0.046 (2 used)
AK - Idler Gear, 12 and 30 teeth
AL - Idler Shaft
AM - Washer, 0.632x1.0x0.010
AN - Spacer, 0.633x0.87x0.755
AO - Drive Chain Sprocket (Kit)
AP - Bevel Gear (Kit)
AQ - Shim(s) (AR)1
AR - Drive Shaft
AS - Gear, 1st (order with Z)
AT - Gear, 2nd (order with AA)
AU - Gear, 3rd (order with AB)
AV - Gear, 4th (order with AC)
AW - Gear, 5th (order with AD)
AX - Spacer, 0.781x1.0x0.375
AY - Washer, 0.632x1.0x0.060
AZ - Washer, Neoprene (2 used)
BA - Washer, 0.758x1.25x0.031 (2 used)
BB - Axle, LH
BC - Differential Bevel Gear (4 used) (Kit with BF)
BD - Retaining Pin (2 used) (Kit)
BE - Ring Gear
BF - Cross Shaft (Kit with BC)
BG - Axle, RH
BH - Washer (AR)Use in various combinations to maintain proper clearance.
BI - Lock Nut
BJ - Bolt (2 used)
BK - Bracket
BL - Washer, 0.321x1.0x0.055
BM - Spring
BN - Brake Lever
BO - Spacer, 0.604x1.076x0.395
BP - Dowel Pin (2 used)
BQ - Brake Jaw
BR - Striker Plate
BS - Friction Puck (2 used)
BT - Brake Disc
BU - Case



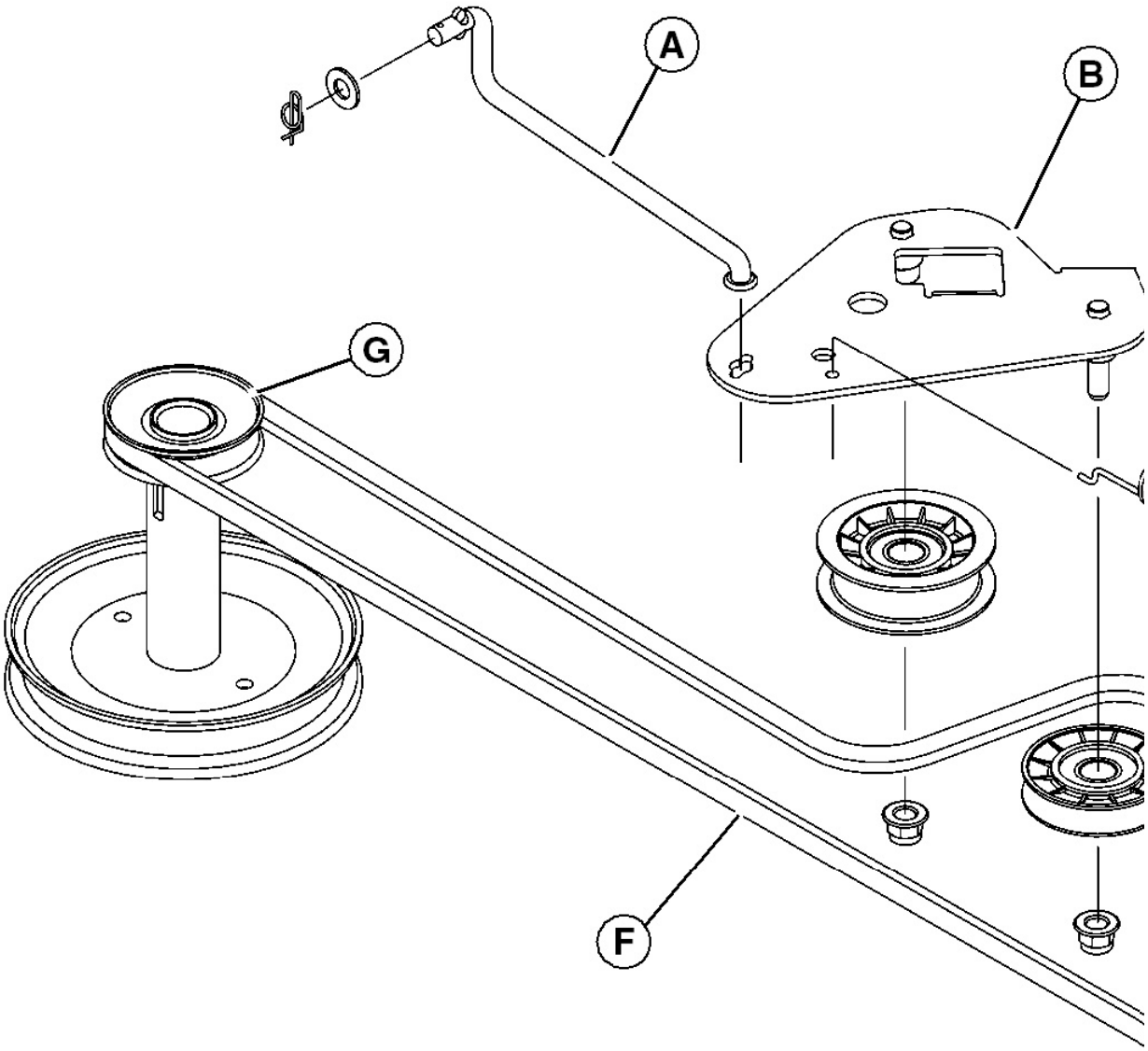
Shims (R and AQ) are needed when any gears or case halves are being replaced.

Clutch Pedal And Belt Traction Drive Operation

Function:

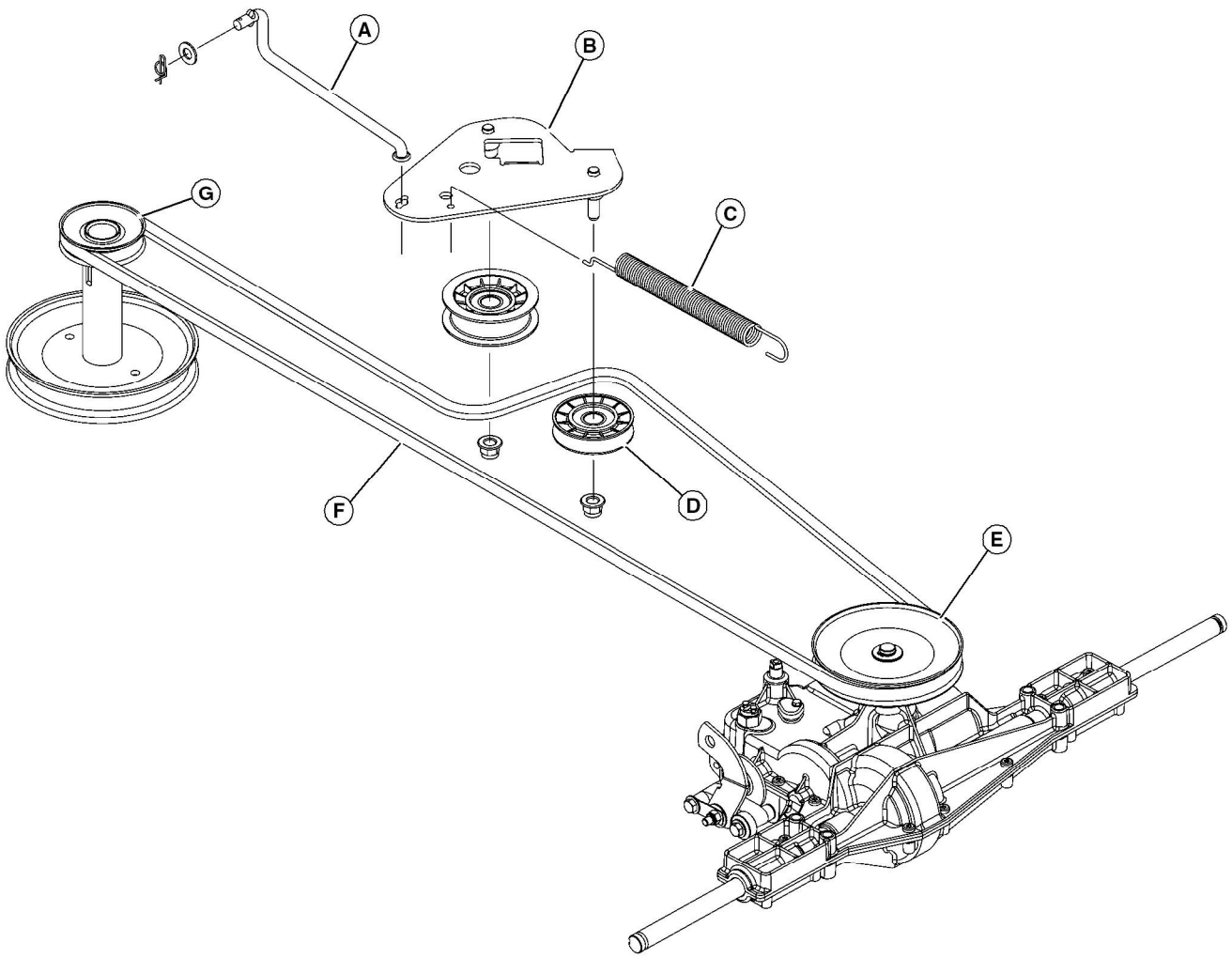
To transfer power from the engine to the 5-speed transaxle. This system also allows the power transfer to be interrupted in order to stop in gear, change to a different gear or direction, engage power again, or shift to neutral and push the unit with the engine on or off.

Theory of Operation:


A
B
G
F

With engine running and clutch engaged (clutch/brake pedal released), the engine drive sheave (G) pulls the drive belt (F) and transmits power to the transaxle drive sheave (E). As clutch/brake pedal is depressed by the operator, the clutch rod (A) rotates the tensioning bracket assembly (B) clockwise. As the tensioning bracket assembly pivots, the tensioning sheave (D) moves to the left and rearward, releasing drive belt tension. This allows the engine drive sheave (G) to rotate without transferring any power through the slackened drive belt.

As the tensioning bracket pivots, the belt tensioning spring (C) is stretched, building additional tension in the spring. As the operator begins to ease-up on the clutch/brake pedal, the tensioning spring pulls the tensioning sheave (D) into the drive belt, tightening the belt and seating it in the grooves of the transaxle drive sheave (E) and the engine drive sheave (G). This interaction of components results in turning the transaxle drive sheave rapidly in a clockwise direction, transferring power from the engine to the 5-speed transaxle.


A
B
C
D
E
F
G

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Transaxle Operation

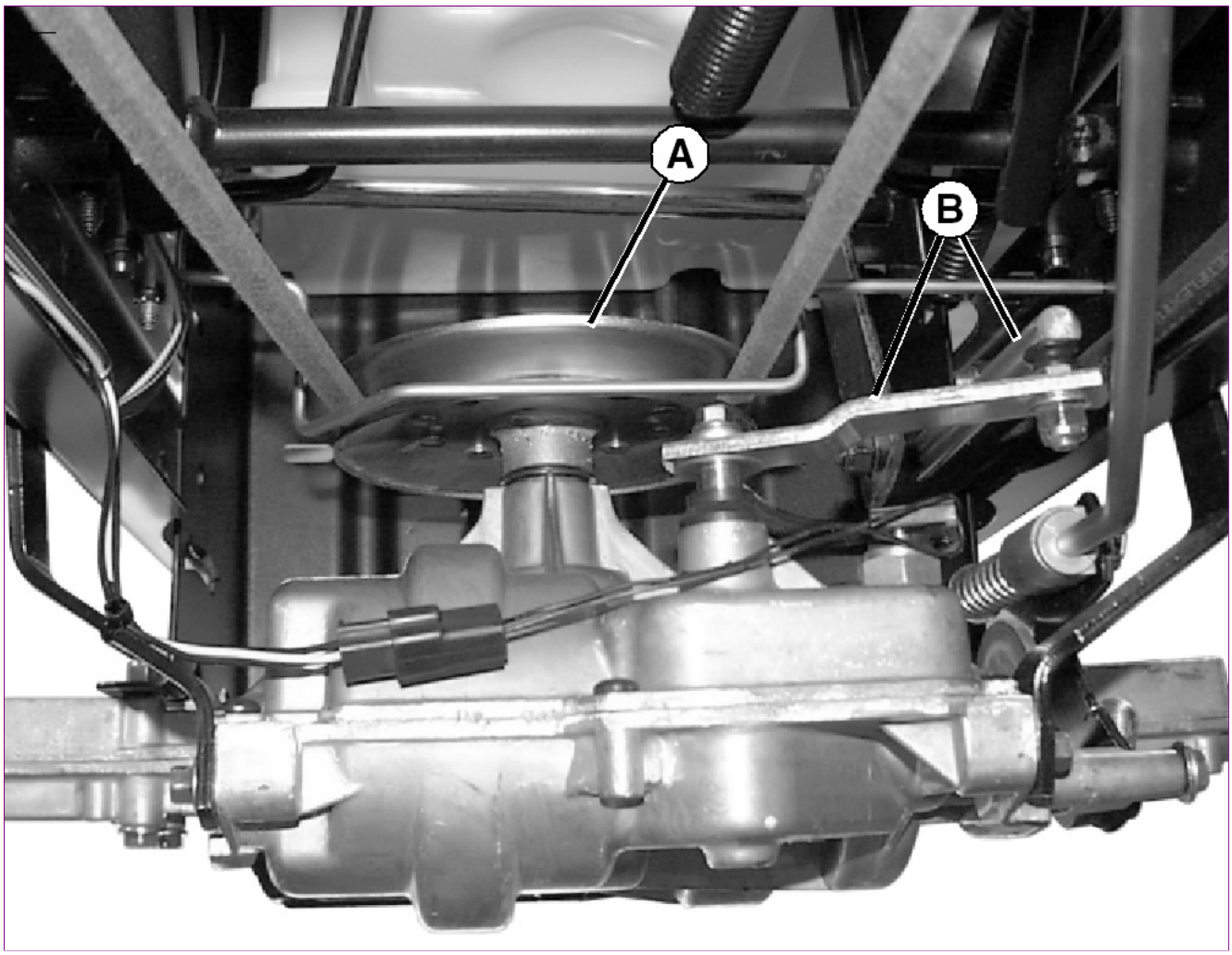
Transaxle Operation

Function:

The transaxle transmits power from the engine, through the belt traction drive system, into the transaxle gear matrix, and out the drive axles to the rear wheels. The transaxle provides a gear selection of five forward speeds and one reverse speed.

It also provides the means to interrupt the flow of power when shifted into neutral.

Theory of Operation:

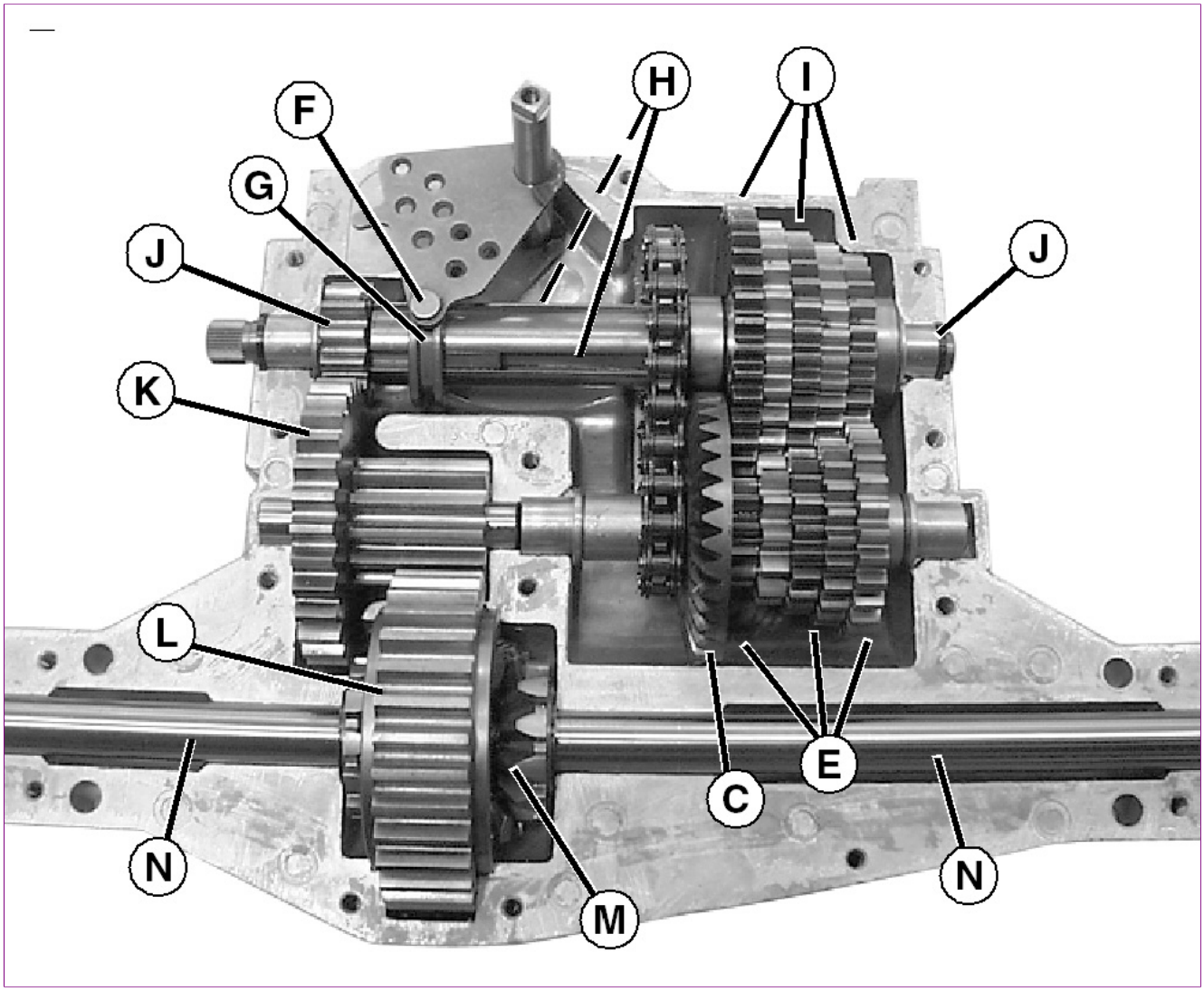


Forward:

With engine running and clutch engaged, the transaxle input sheave (A) turns rapidly in a clockwise direction. The sheave is retained by a snap-ring and keyed to the input shaft.

A forward gear is selected when the operator moves the shift lever. The shift linkage (B) moves a shifter fork into one of the selected five transfer gears. Power is transferred by the selected gear to the spur gear.

The spur gear transfers power into the differential ring gear. Power is transferred by the cross shaft and bevel gears to both drive axles out to the wheels and tires. The keyed drive wheels are retained by a snap ring.



The input pinion gear, that is splined to the input shaft and retained by a snap ring, drives the beveled drive gear (C). The beveled drive gear is splined to the drive shaft (D), as are the five forward drive gears (E).

A forward gear is selected when the operator moves the shift lever. The shift linkage moves the shifter fork (F), shift collar (G), and shift keys (H) into one of the selected five transfer gears (I). The selected gear is now keyed to the intermediate/brake shaft (J). Power is transferred by the selected gear (I) on the shaft to the splined spur gear (J).

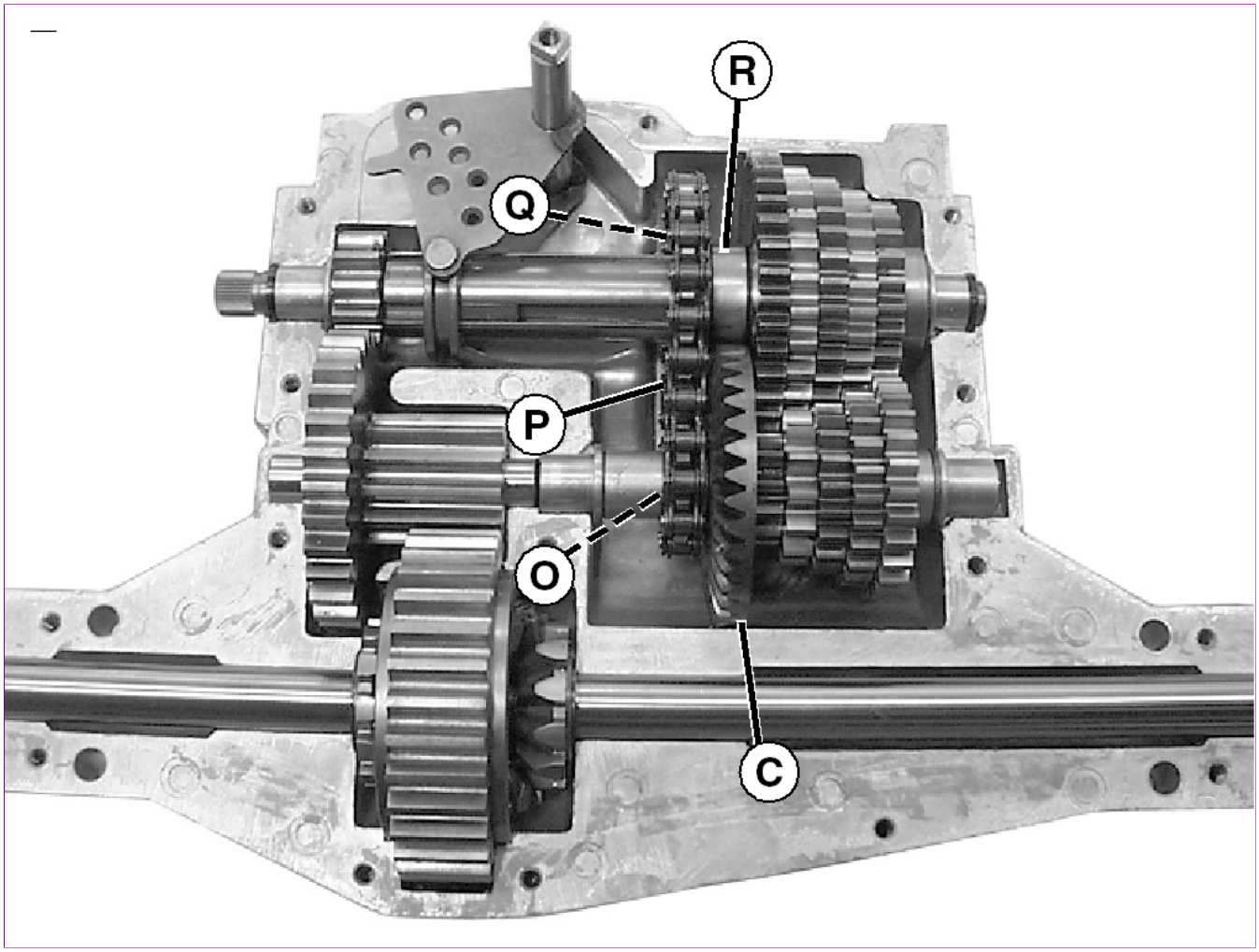
The spur gear (J) drives the combination gear (K), on the idler shaft, and transfers power into the differential ring gear (L). Power is transferred by the cross shaft and bevel gears (M) to both drive axles (N) out to the wheels and tires. The keyed drive wheels are retained by an E-ring.

Reverse:

As in forward - likewise in reverse, with engine running and clutch engaged, the transaxle input sheave turns rapidly in a clockwise direction.

When the operator shifts the shift lever into reverse, the shifter fork, shift collar, and shift keys become keyed to the large drive chain sprocket, and turns free-wheeling transfer gears in the opposite direction, transferring power in the opposite direction as they did in forward.

Power is then transferred into the differential and out the drive axles to the drive wheels and tires.



Power is transferred through the belt drive sheave into the input shaft pinion gear. The bevel drive gear (C) of the splined drive shaft then carries the power through the splined small drive chain sprocket (O), the drive chain (P), and into the large drive chain sprocket (Q) of the intermediate shifter/brake shaft.

When the operator shifts the shift lever into reverse, the shifter fork, shift collar, and shift keys become keyed to the large drive chain sprocket (Q), and turns in the opposite direction as the free-wheeling transfer gears. Because the large drive chain sprocket has been engaged by the shift keys, the shaft turns in the reverse direction and transfers power through the left side spur gear into the idler shaft combination gear, and also turn in the opposite direction as they did in forward.

Neutral:

When the operator moves the shift lever into NEUTRAL position, the shifter fork places the shift keys under the free-floating spacer (R), allowing no power to be transmitted into the intermediate shifter/brake shaft, and allows neutral to be maintained with clutch pedal released and engine running.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Brake System Operation

Brake System Operation

Function:

The brake system allows the operator to slow down, stop, or lock the machine into park position.

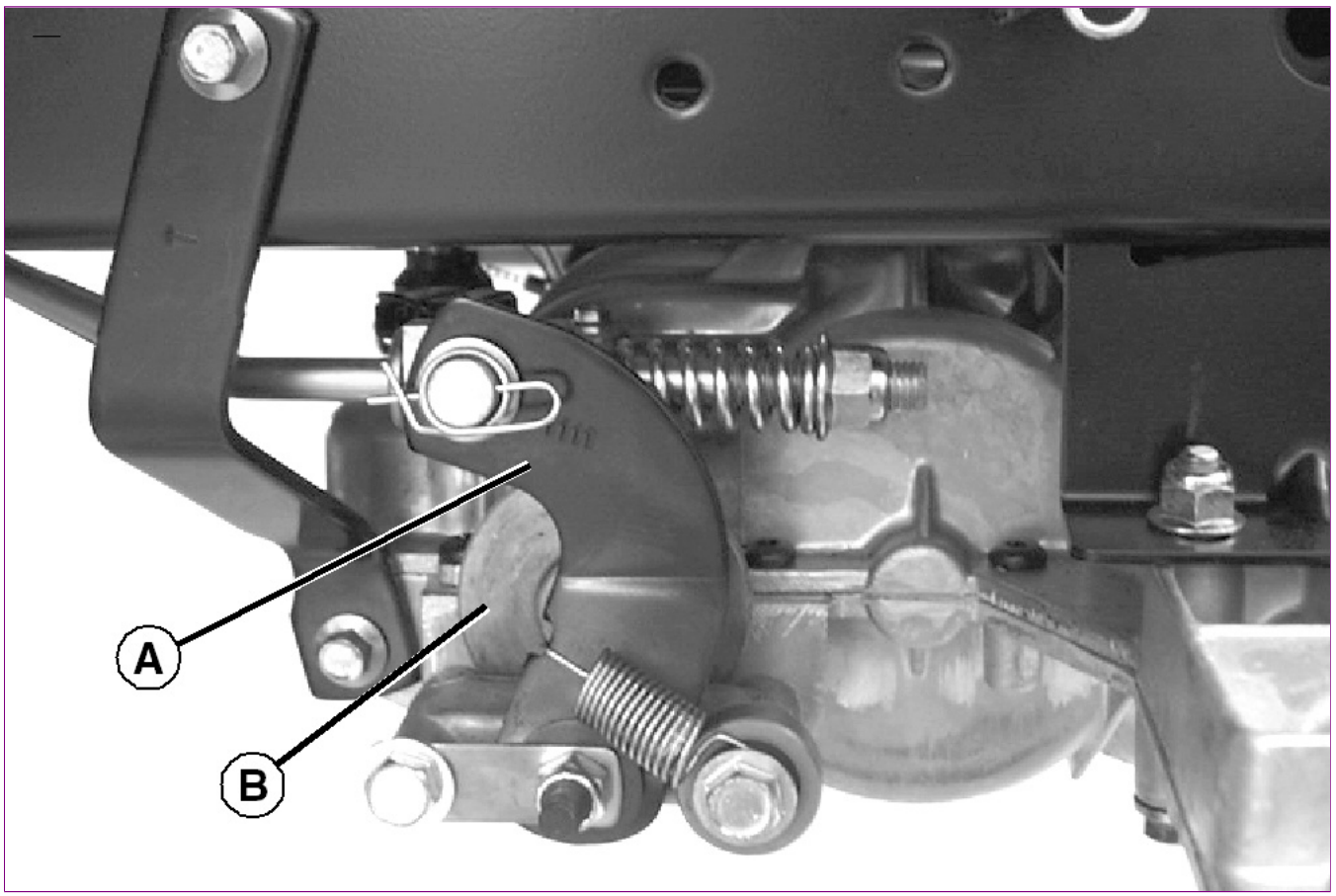
Theory of Operation:

NOTE:

Clutch/brake pedal has approximately 127 mm (5 in.) of travel.

The first segment of clutch/brake pedal travel is taking-up freeplay in the linkage and start of rotation of tensioning bracket assembly.

The next segment of travel is rotating the tensioning bracket and idler assembly fully, overcoming the belt tensioning spring and fully disengaging the traction drive system. As the pedal is released, the belt tensioning spring pulls the tensioning bracket and idler assembly into the belt, tensioning the belt and fully engaging the traction drive system.



The last segment of travel is engaging the brake system and manually locking of the park brake linkage. The brake lever (A) with the bottom cam surface contour, pushes pins against the striker plate. The striker plate forces the thicker, outer friction puck against the brake disc (B). The two friction pucks press against both sides of the brake disc. The brake disc is splined to the end of the intermediate shifter/brake shaft. When the compression force of the friction pucks is great enough to stop the brake disc rotation, the transaxle and wheels stop turning. This works in conjunction with the clutching system.

With the clutch/brake pedal fully depressed and the traction drive system disengaged (fully clutched), the park brake lever assembly can be engaged, locking the clutch/brake pedal linkage and the brake disc in park position.

When the clutch/brake pedal is released and the traction drive system is engaged, there must be ample clearance between the friction pucks and the brake disc to prevent the disc brake from dragging.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Gear Transmission Check

Gear Transmission Check

Test Procedure:

Test Conditions:

- Machine on level surface.
- Engine OFF.
- Front wheels blocked.
- Rear wheels raised off surface with axle housings on jack stands.

1 Drive Belt:

Action:

Is the drive belt in good condition and not glazed, split, unraveled, or stretched?

Result:

YES: Go to next step.

NO: Replace drive belt.

Action:

Are the sheaves, idlers, and guides in good condition?

Result:

YES: Go to next step.

NO: Replace any loose, worn, or damaged components.

1 Transaxle:

Action:

Are the brake disc and pads worn or binding?

Result:

NO: Go to next step.

YES: Repair or replace.

Action:

Does the transaxle shift smoothly and obtain all gears?

Result:

YES: Go to next step.

NO: Repair or replace transaxle components or transaxle.

Action:

Does the transaxle exterior have cracks, leaks, or loose hardware?

Result:

NO: Go to next step.

YES: Tighten hardware. Repair or replace components or transaxle as needed.

1 Axles:

Action:

Are the axles straight?

Result:

YES: Go to next step.

NO: Replace transaxle as needed.

1 Tires, Wheels, and Axles:

Action:

Are the tire pressures equal and to specification?

Result:

YES: Go to next step.

NO: Adjust air pressure.

Action:

Are the driving tires the same size?

Result:

YES: Go to next step.

NO: Install same size tires.

Action:

Are wheels bent or out of round?

Result:

NO: Go to next step.

YES: Replace wheels.

Action:

Are keys, keyways, and E-rings in good shape and seated correctly?

Result:

YES: Go to next step.

NO: Repair or replace as needed.

Test Conditions:

- Machine running in test area.
- Engine at operating temperature.
- Tests run at engine slow idle and fast idle.
- Transaxle run through all speeds in both directions.

1 Engine Performance:

Action:

Is the engine running smoothly throughout throttle range, and is it being operated at high idle?

Result:

YES: Go to next step.

NO: Adjust, tune, or repair engine. See appropriate engine section.

1 Drive Belt:

Action:

Is the drive belt jumping off or slapping?

Result:

YES: See “Troubleshooting” below.

NO: Go to next step.

Action:

Is the drive belt squealing or vibrating?

Result:

YES: Check belt condition. Replace belt as necessary.

NO: Go to next step.

1 Transaxle Shifting:

Action:

Is the shifting smooth and all gears obtained?

Result:

YES: Go to next step.

NO: Check shift linkage adjustment. Adjust, repair or replace as necessary.

NO: Check clutch/brake linkage adjustment and condition. Adjust, repair or replace as needed.

NO: Repair or replace transaxle.

Action:

Does the machine maintain a constant speed?

Result:

YES: Go to next step.

NO: Check belt condition.

NO: Check adjustment and condition of idlers and guides.

NO: Check brake components. Repair or replace as needed.

NO: Check axles, wheels, and tires.

Action:

Do the brakes stop and hold machine on 17 slope?

Result:

NO: Check brake linkage and brake components. Repair or replace as needed.

NO: Repair or replace transaxle.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Troubleshooting

Troubleshooting

Symptom	Problem	Solution
Belt Jumping Off or Slapping	Belt sheaves, idlers, and guides loose, out of adjustment, worn, or damaged.	Tighten, replace, or adjust properly.
	Belt worn, frayed, glazed, or stretched.	Replace belt.
	Clutch/brake pedal linkage out of adjustment.	Adjust clutch/brake pedal linkage. See Shift Linkage Adjustment .
	Input shaft components worn, stripped, or broken.	Replace components or transaxle.
Symptom	**Problem**	**Solution**
Machine Will Not Move Forward or Reverse	Traction belt worn, frayed, glazed or stretched.	Replace traction belt. See Traction Drive Belt Removal and Installation .
	Traction belt not properly tensioned.	Check belt tensioning spring and belt. Replace worn/ damaged/missing parts.
	Clutch/brake pedal linkage out of adjustment.	Adjust clutch/brake pedal linkage properly.
	Input sheave or axle keys or keyways worn or damaged.	Replace keys. If keyways are worn, replace axle(s) or transaxle.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
Symptom	**Problem**	**Solution**
Loses Power Under Load, Belt Slips, or Erratic Drive	Traction belt worn, frayed, glazed or stretched.	Replace traction belt. See Traction Drive Belt Removal and Installation .
	Traction belt not properly tensioned.	Check belt tensioning spring and belt. Replace worn/ damaged/missing parts.
	Clutch/brake pedal linkage out of adjustment.	Adjust clutch/brake pedal linkage properly.
	Input sheave or axle keys or keyways worn or damaged.	Replace keys. If keyways are worn, replace axle(s) or transaxle.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**
Jerky or Aggressive Engagement	Traction belt worn, frayed, glazed or stretched.	Replace traction belt. See Traction Drive Belt Removal and Installation .
	Belt sheaves, idlers, and guides loose, out of adjustment, worn, or damaged.	Tighten, replace, or adjust properly.

	Clutch/brake pedal linkage out of adjustment.	Adjust clutch/brake pedal linkage properly.
	Input sheave or axle keys or keyways worn or damaged.	Replace keys. If keyways are worn, replace axle(s) or transaxle.
	Incorrect type or volume of lubricant used.	Replace with correct type and volume of lubricant.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**
Cannot Get All Forward Gears	Clutch/brake components worn, bent, or broken.	Replace and adjust properly.
	Shift lever and linkage bent, worn, out of adjustment, or broken.	Adjust properly or repair as necessary. See Shift Linkage Adjustment .
	Incorrect type or volume of lubricant used.	Replace with correct type and volume of lubricant.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**
Cannot Get Reverse Gear	Clutch/brake components worn, bent, or broken.	Replace and adjust properly.
	Shift lever and linkage bent, worn, out of adjustment, or broken.	Adjust properly or repair as necessary. See Shift Linkage Adjustment .
	Incorrect type or volume of lubricant used.	Replace with correct type and volume of lubricant.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**
Cannot Get Reverse Gear	Clutch/brake components worn, bent, or broken.	Replace and adjust properly.
	Shift lever and linkage bent, worn, out of adjustment, or broken.	Adjust properly or repair as necessary. See Shift Linkage Adjustment .
	Incorrect type or volume of lubricant used.	Replace with correct type and volume of lubricant.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**

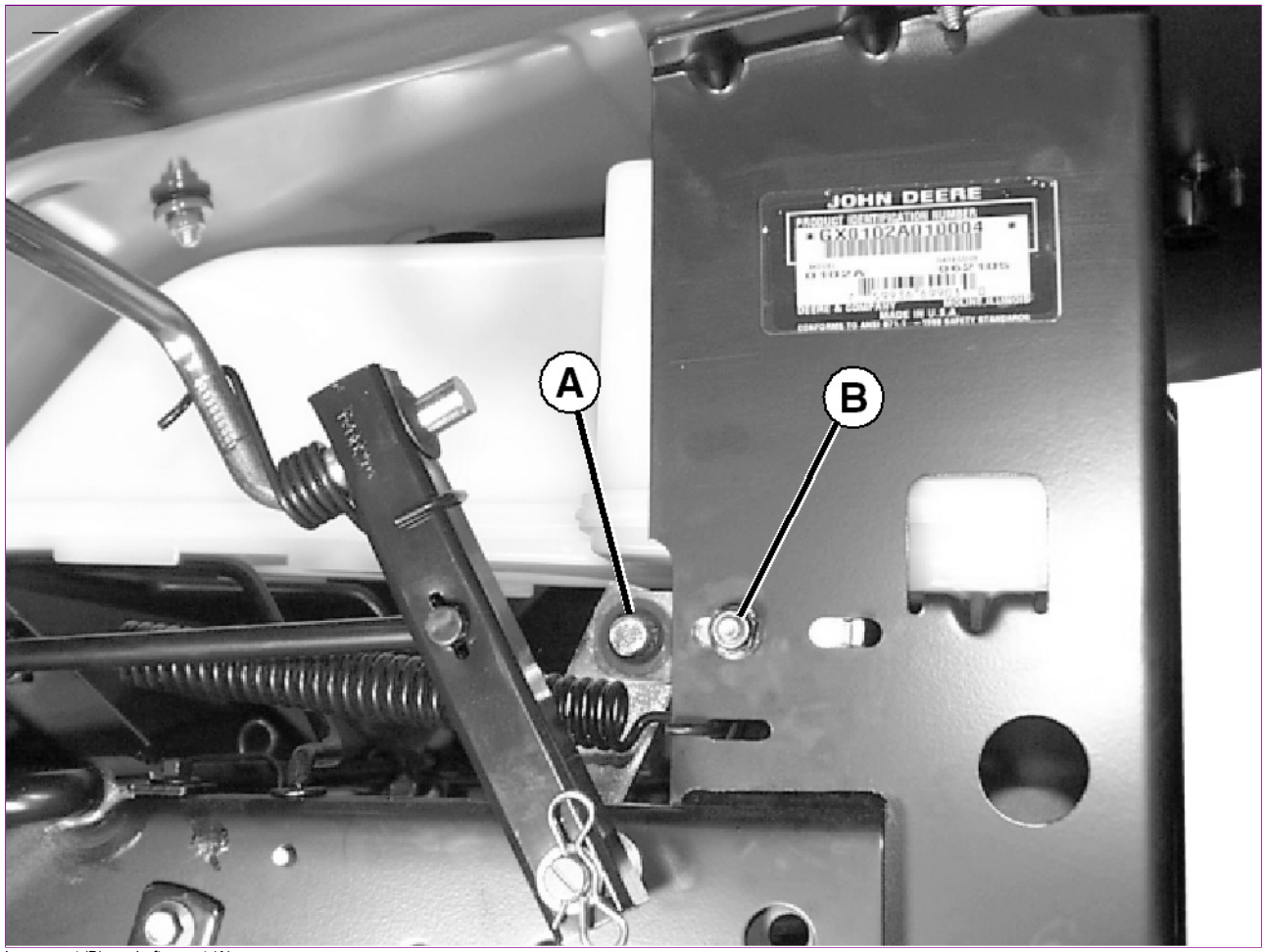
Jumps Out of Gear, Shifts Hard, or Must Hold Into Gear	Clutch/brake components worn, bent, or broken.	Replace and adjust properly.
	Shift lever and linkage bent, worn, out of adjustment, or broken.	Adjust properly or repair as necessary. See Shift Linkage Adjustment .
	Incorrect type or volume of lubricant used.	Replace with correct type and volume of lubricant.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
	Transaxle case halves worn or broken.	Replace transaxle case.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**
Noisy Operation	Traction belt worn, frayed, glazed or stretched.	Replace traction belt. See Traction Drive Belt Removal and Installation .
	Belt sheaves, idlers, and guides loose, out of adjustment, worn, or damaged.	Tighten, replace, or adjust properly.
	Input sheave or axle keys or keyways worn or damaged.	Replace keys. If keyways are worn, replace axle(s) or transaxle.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.
	Transaxle case halves worn or broken.	Replace transaxle case.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**
Leaking Grease	Transaxle case halves worn or broken.	Replace transaxle case.
	Incorrect type or volume of lubricant used.	Replace with correct type and volume of lubricant.
	Intermediate shifter/brake shaft or axle seals worn or damaged.	Replace seals.
	Transaxle cap screws loose or case holes stripped.	Tighten cap screws or replace transaxle case.
Symptom	**Problem**	**Solution**
Brakes Do Not Function Properly	Clutch/brake pedal linkage out of adjustment.	Adjust clutch/brake pedal linkage. See Shift Linkage Adjustment .
	Brake components worn, bent, or broken.	Replace components.
	Axle keys or keyways worn or damaged.	Replace keys. If keyways are worn, replace axle(s) or transaxle.
	Internal transaxle components worn, stripped, or broken.	Replace components or transaxle.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Shift Linkage Adjustment

Shift Linkage Adjustment

Procedure:

1. Raise and support machine to remove left rear wheel.
2. Place shifter in NEUTRAL.



3. Loosen nut (B) on shaft mount (A).

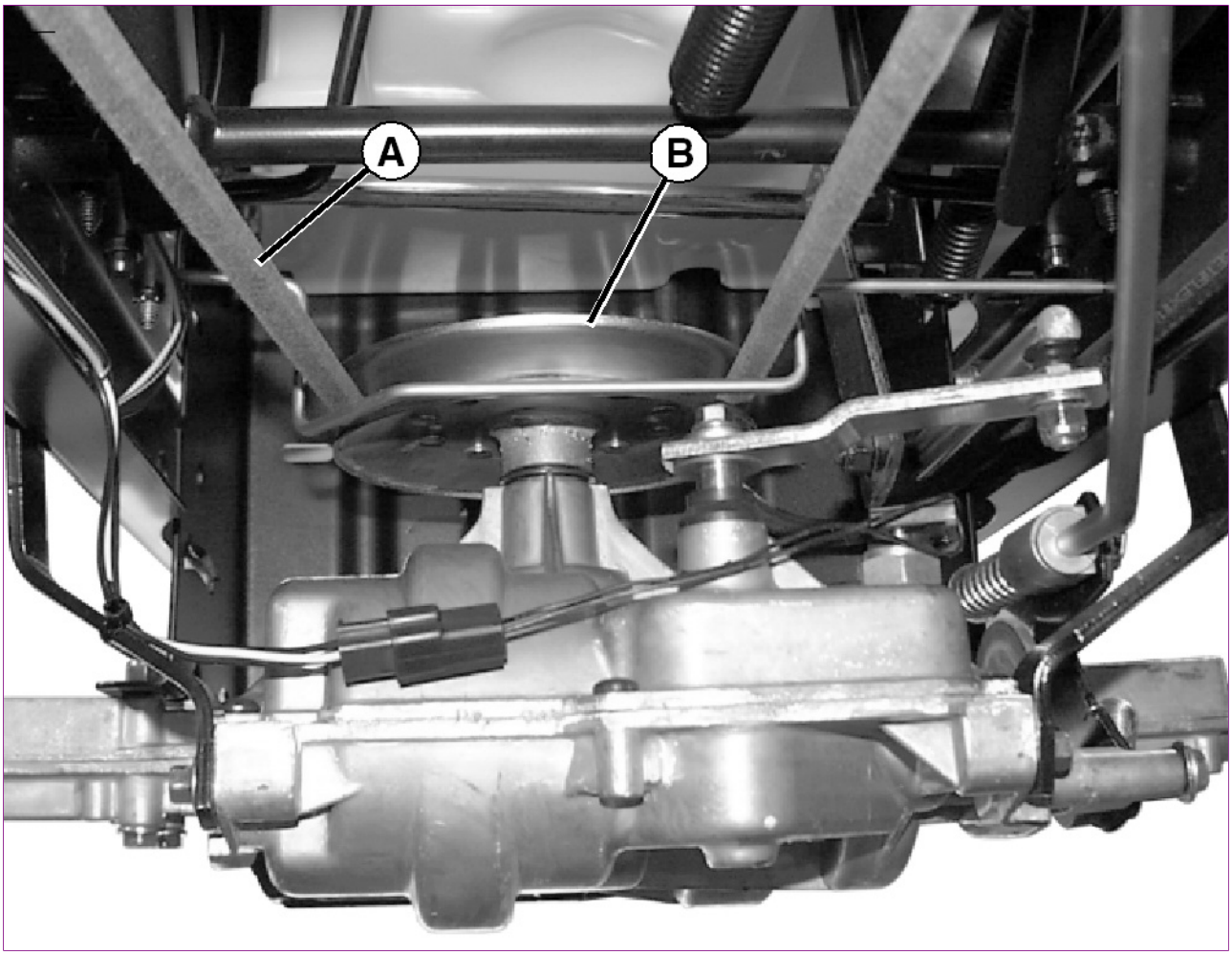
4. 

Slide shaft mount forward or backward to center shifter in the NEUTRAL slot (C).
5. Tighten nut (B) on shaft bracket.

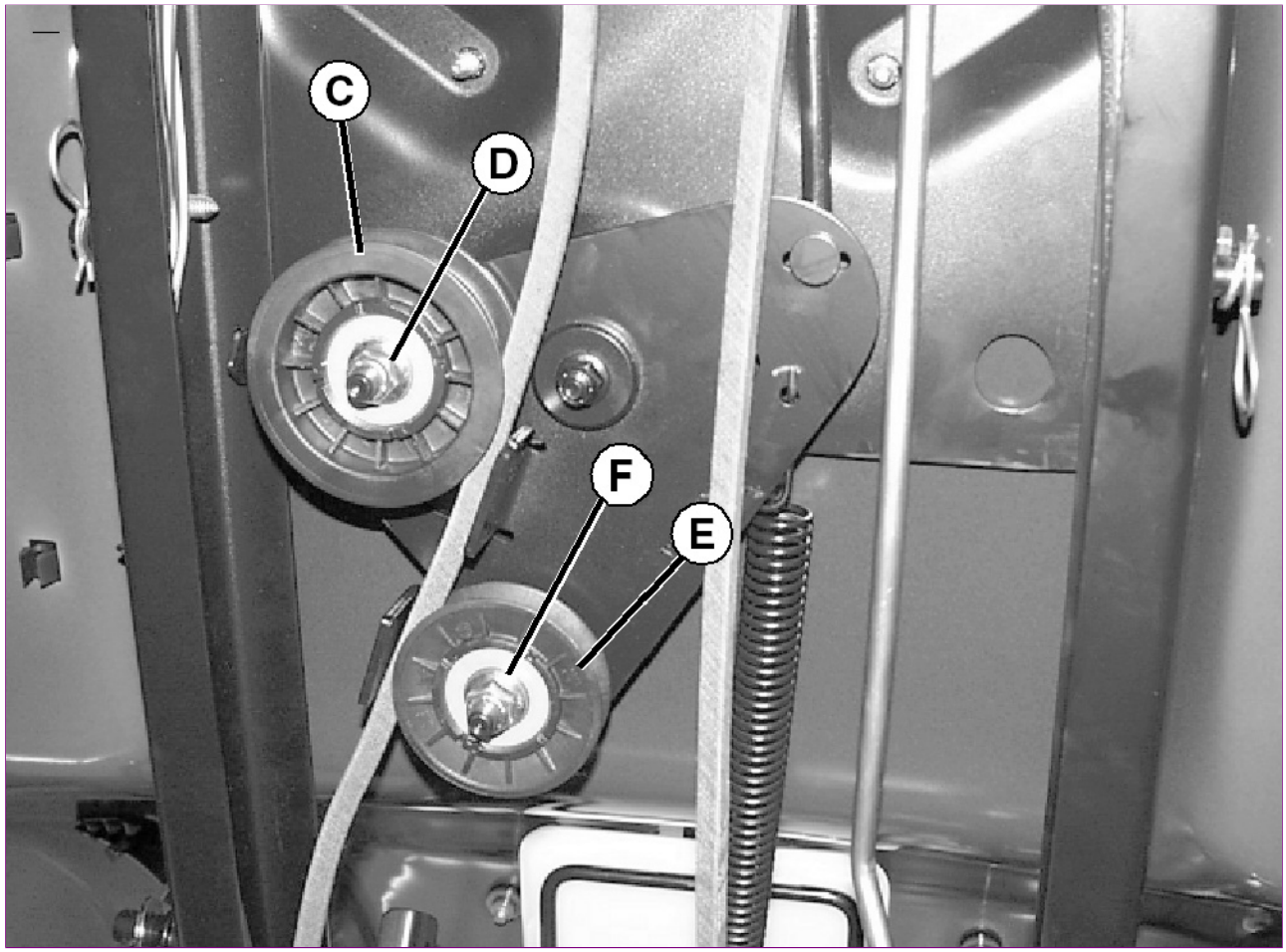
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Traction Drive Belt Removal and Installation

Traction Drive Belt Removal and Installation

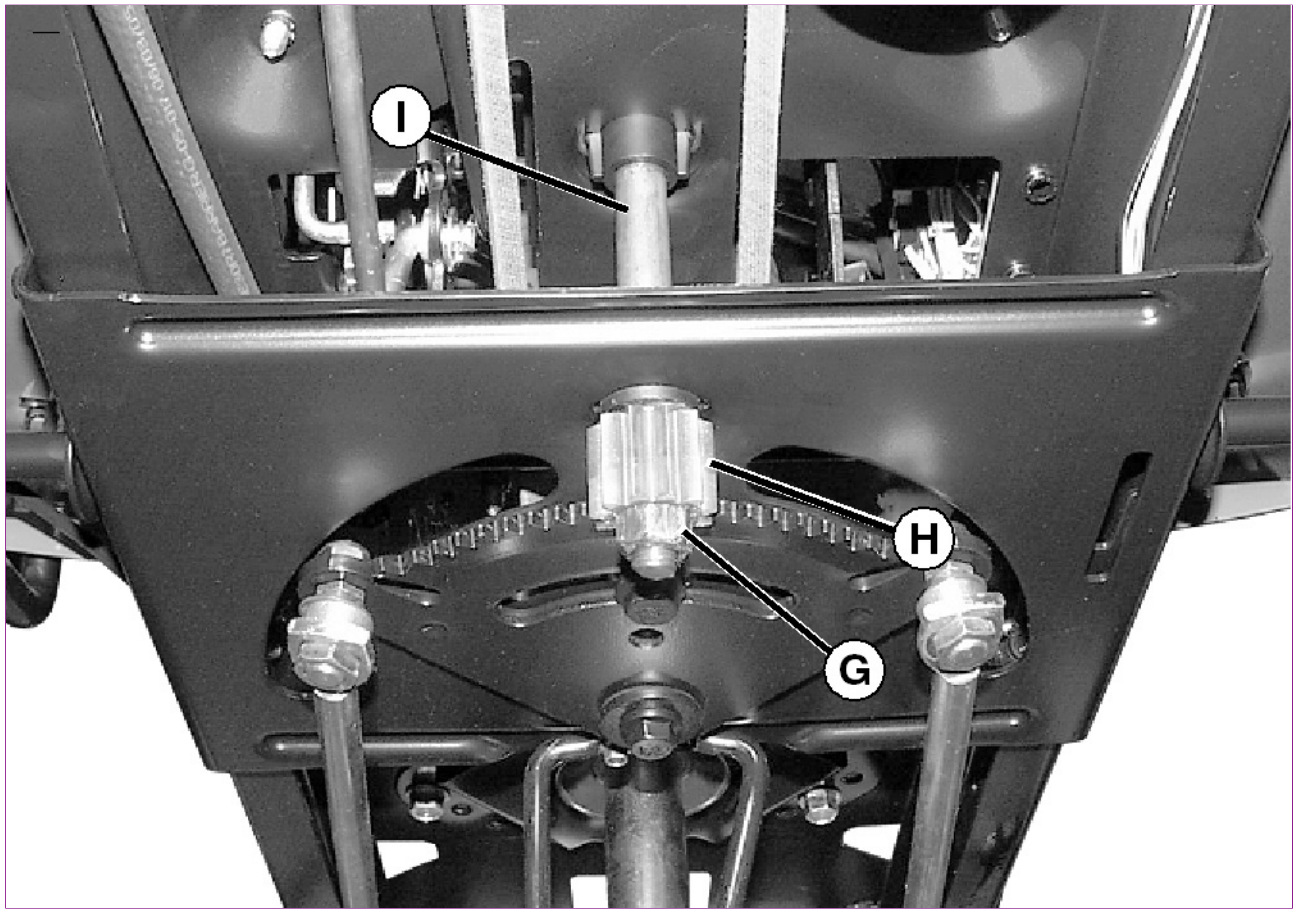
Removal:

1. Park machine on a level surface. Turn engine OFF. Remove ignition key.
2. Remove mower deck. See Removing Mower Deck in the Attachments section.
3. Engage park brake to relieve tension on traction drive belt.
4. 

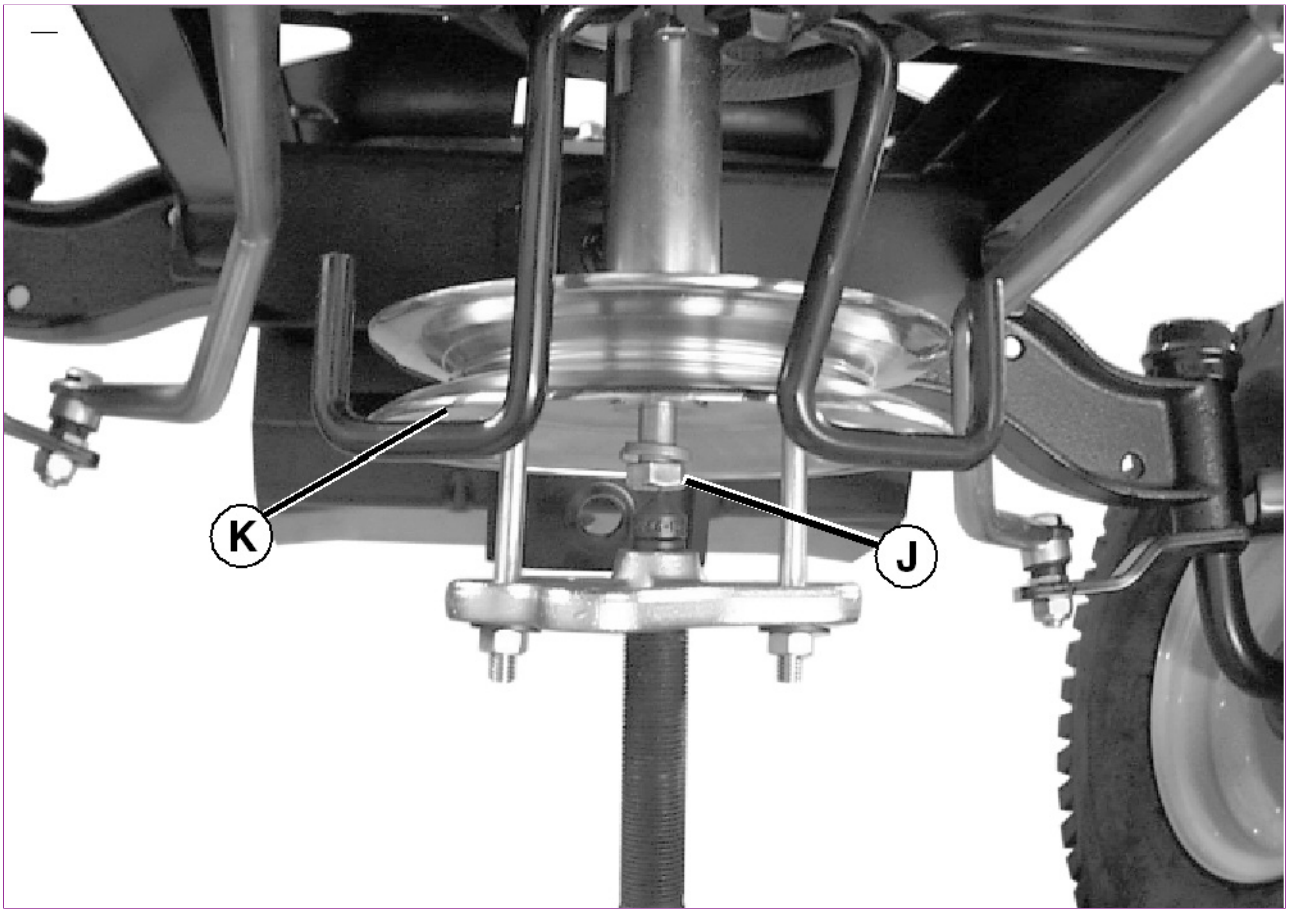
Remove belt (A) from around transaxle drive sheave (B).

5. 

Loosen nut (D) on V-Idler (C). Remove belt from V-idler.
6. Loosen nut (F) on flat idler (E). Remove belt.

7. 

Remove nut (G) and pinion gear (H).
8. Raise steering shaft (I) only enough to clear belt.

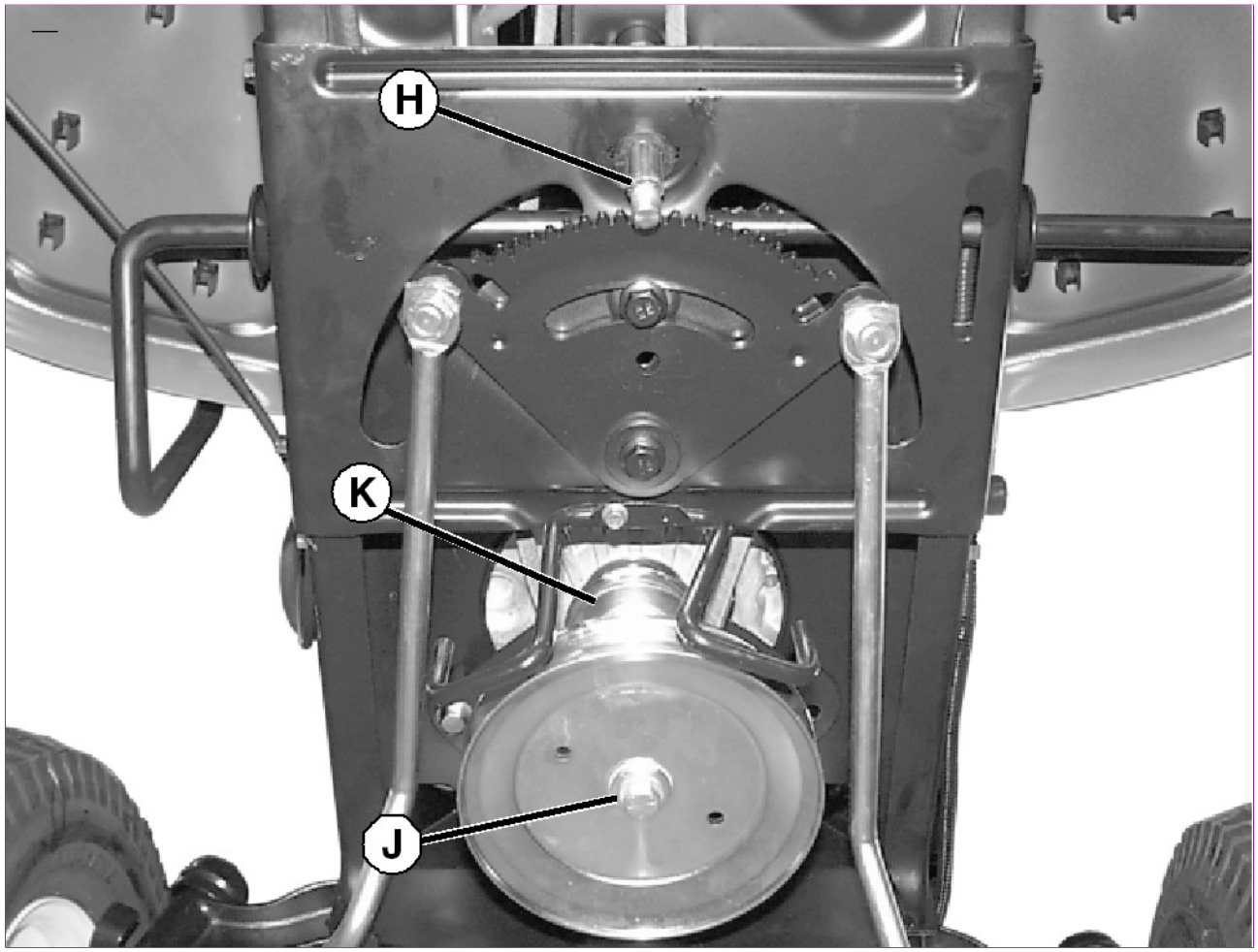


9. Loosen cap screw (J) and lock washer securing pulley assembly (K) to engine output shaft.
10. **IMPORTANT:**

    Do not pry pulley assembly or sheaves will bend and require replacement.

    Install puller on lower sheave. Remove pulley assembly.
11. Remove traction drive belt from around pulley.
12. Inspect belt for wear or damage. Replace as necessary.

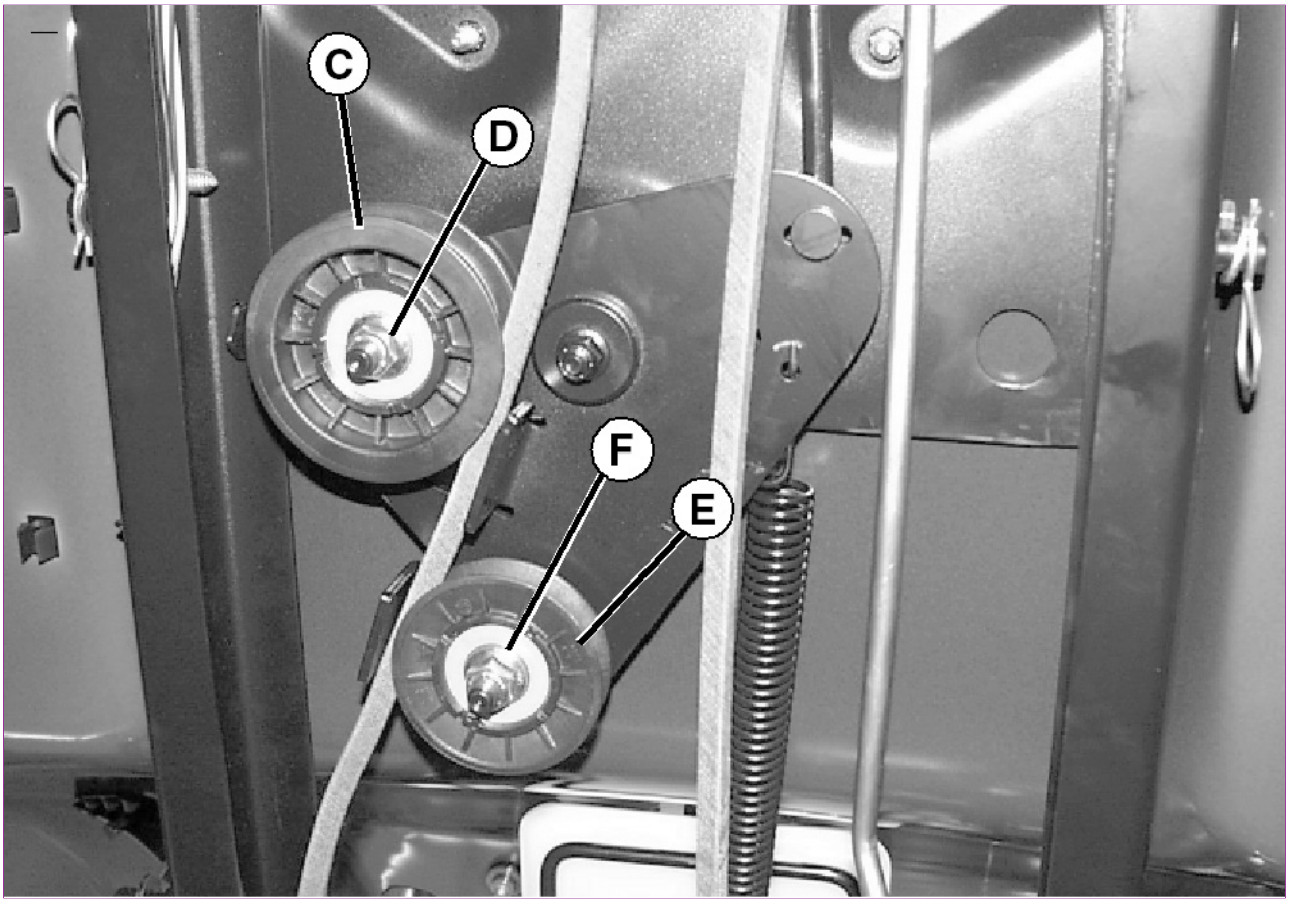
Installation:



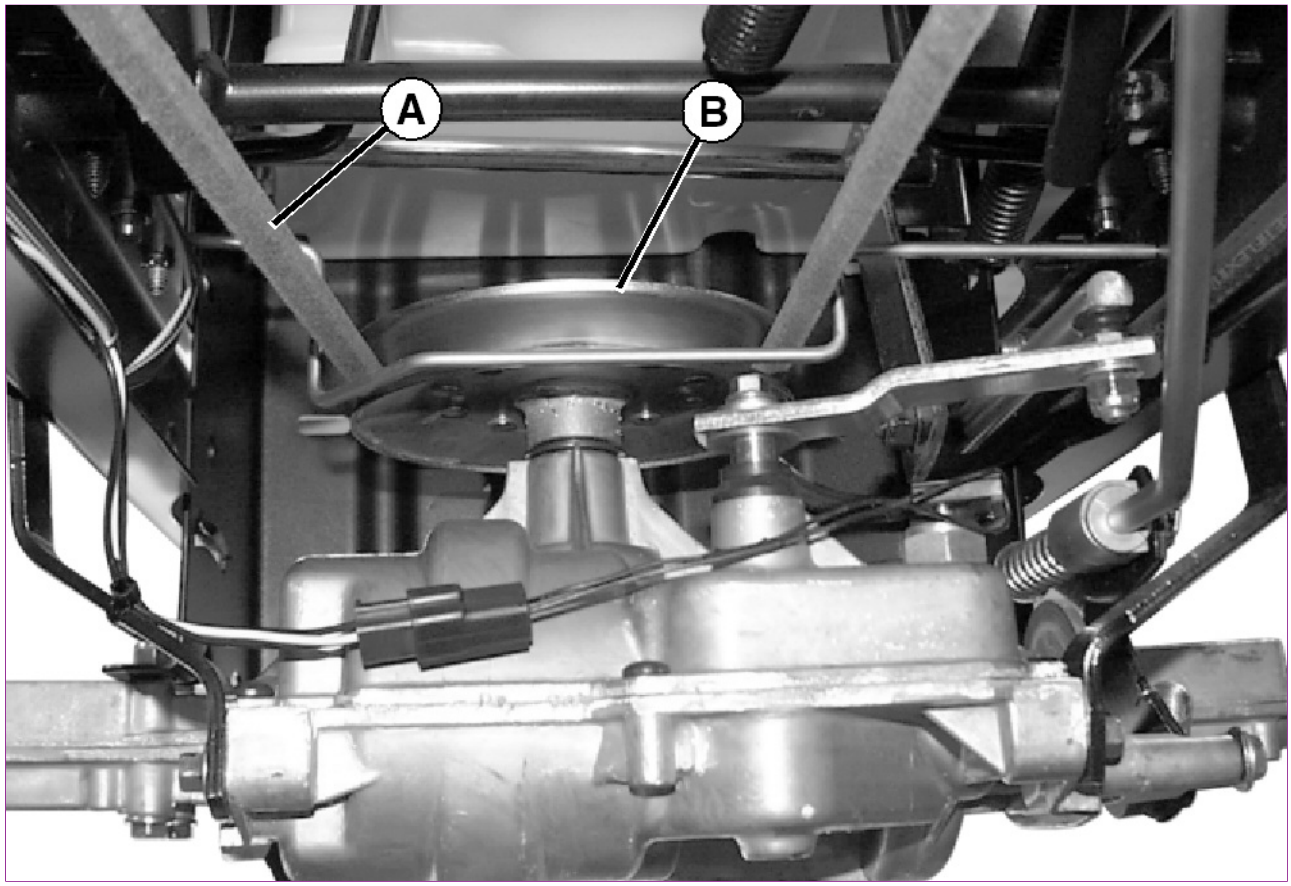
1. Raise steering shaft (H) only enough to clear belt around steering shaft, and guide belt past steering shaft towards front of machine.
2. *NOTE:*

   Before tightening bolt (J) make sure pulley assembly key is aligned with engine crankshaft keyway and drive belt is inside of all three belt guides around sheave.

   Install belt around engine jack sheave (K) and secure jack sheave with washer and bolt (J). Tighten bolt to **75 N•m (55 lb-ft)** .
3. Lower steering shaft, install pinion gear. Secure with nut.

4. 

Guide belt toward rear of machine and around flat idler (C). Tighten nut (D) securing idler to tensioning bracket.
5. Guide belt around V-Idler (E). Tighten nut (F) securing idler to tensioning bracket.

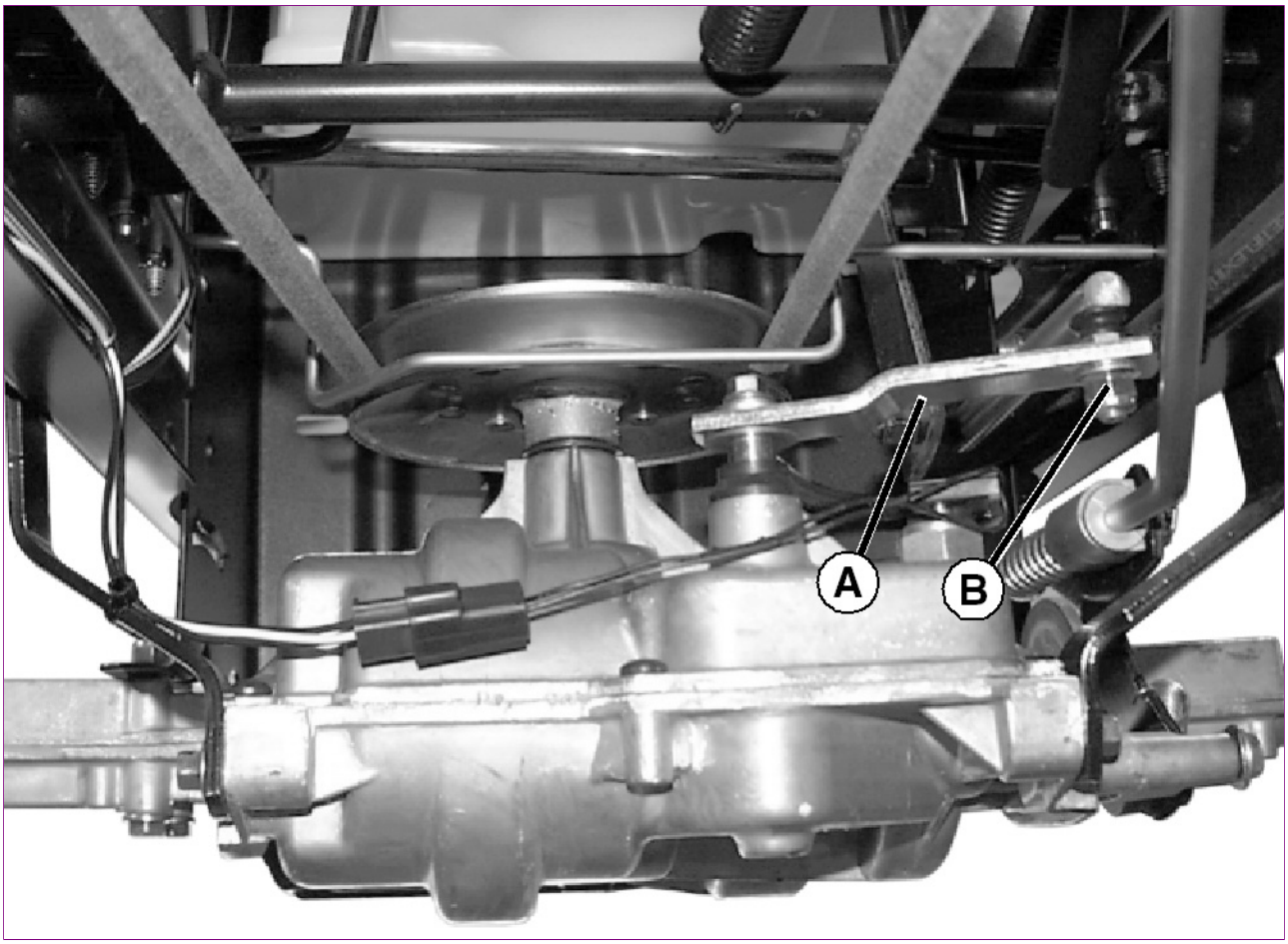
6. 

Install belt (A) around transaxle drive sheave (B).
7. Test function by releasing parking brake and pressing brake pedal (releasing tension on belt). Make sure belt is appropriately running on all idlers/sheaves.
8. Install fender deck. See Fenderdeck Removal and Installation in the Miscellaneous section.
9. Install mower deck. See Installing Mower Deck in the Attachments section.

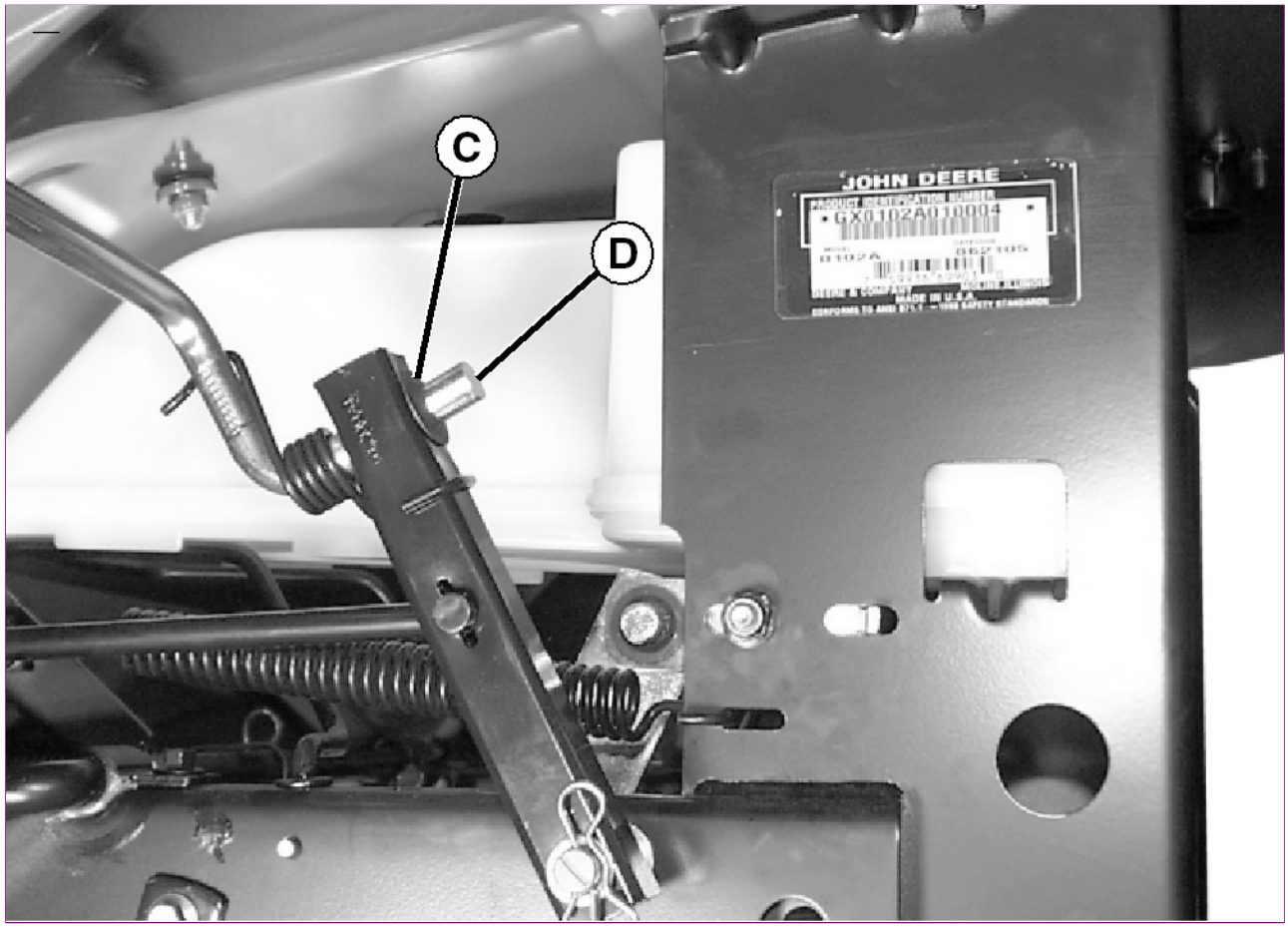
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Shift Linkage Removal and Installation

Shift Linkage Removal and Installation

Removal:

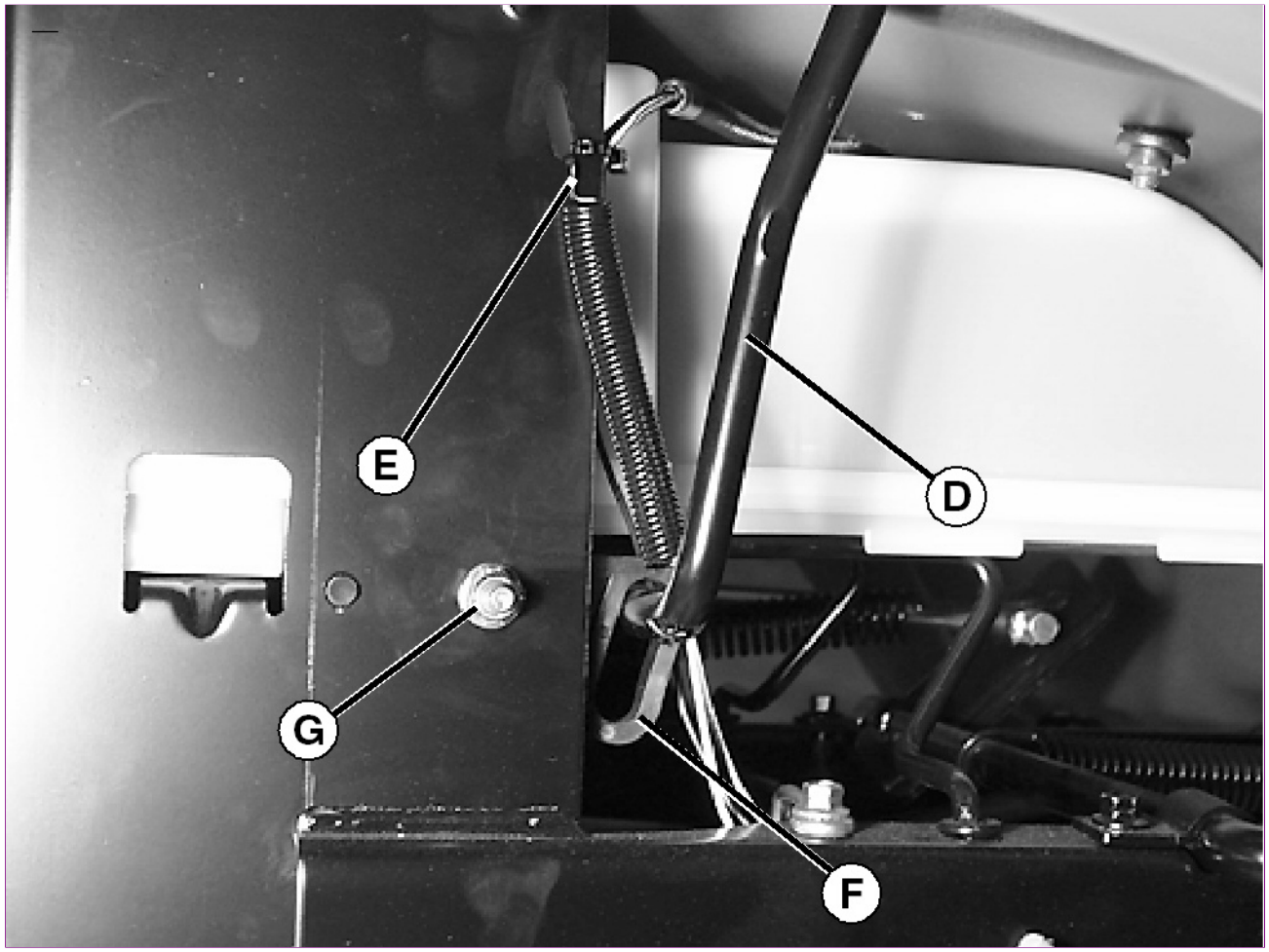
1. Remove battery.
2. Raise and support machine so you can remove right drive wheel.
3. Remove shift knob and nut.
4. 

Remove locknut (B) from transaxle shift arm (A).

5. 

MXML2008120216381131-UN: Left side shown

Remove push nut (C) from shift lever shaft (D) on left-rear side of machine.

6. 

MXML2008120216381132-UN: Right side shown

Remove spring (E) from machine frame and shift lever shaft (D).
7. Remove shift bracket nut (G), bolt and shift shaft arm holder (F).
8. Remove shift linkage from the right side of the frame. You will have to “snake” the shift rod from the machine.
9. Replace necessary components.

Installation:

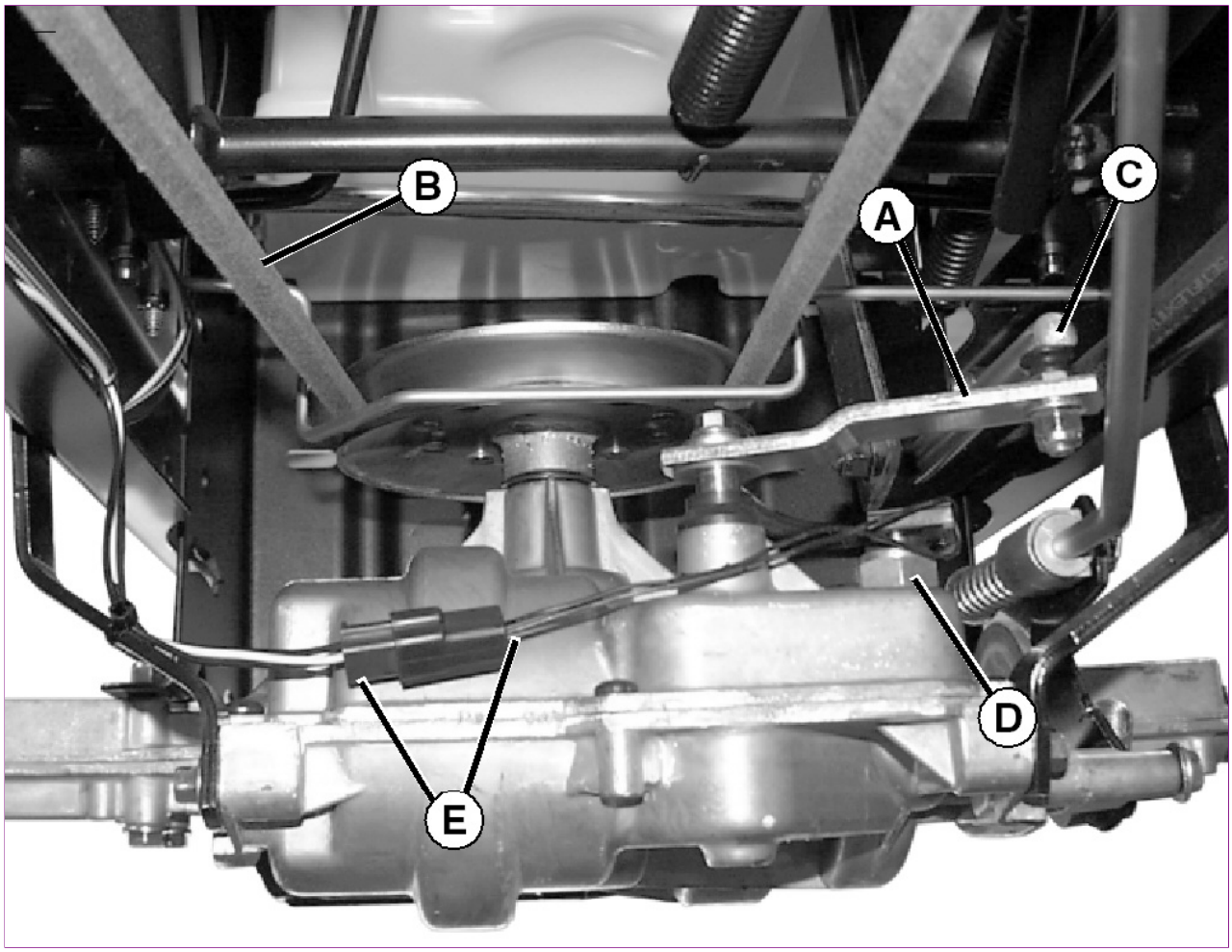
1. Install shift linkage in reverse order of removal.
2. Adjust shift linkage. See Shift Linkage Adjustment .

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Transaxle Removal and Installation

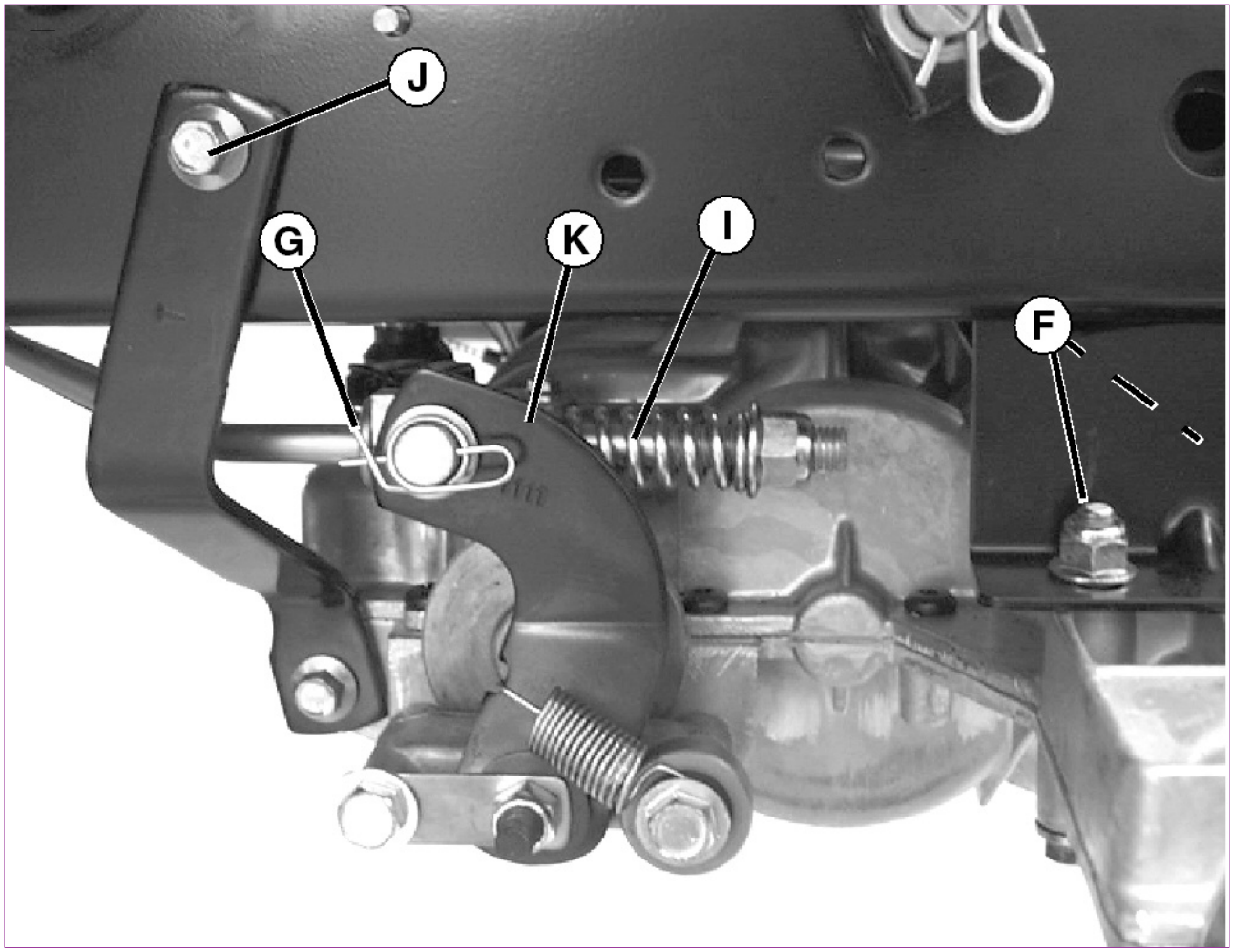
Transaxle Removal and Installation

Removal:

1. Disconnect battery negative (-) cable.
2. Remove mower deck.
3. Raise and block machine off surface supporting frame.
4. Remove rear wheels.



5. Disconnect shift linkage (C) from shift arm (A).
6. Disconnect wiring harness (E) from RIO switch (D) in transaxle.
7. Remove traction drive belt tension spring and belt (B).



8. Disconnect brake rod return spring (H).
9. Remove cotter pin (G) and washer. Disconnect brake rod (I) from brake transaxle brake arm (K).
10. Support transaxle with jack stands or have a helper hold transaxle in place while you remove hardware.
11. Remove front cap screw (J) and two transaxle cap screws and nuts (F).
12. Remove cap screw, and cap screws and nuts from other side of machine frame.
13. Carefully remove transaxle to work bench.

Installation:

1. Install transaxle in reverse order of removal.
2. Tighten mounting hardware to specification.
3. *NOTE:*

   Replacement transaxle will not have tapped hole for left front hanger bracket. Reuse original self tapping cap screw. Tighten to 32.5 N•m (24 lb-ft).

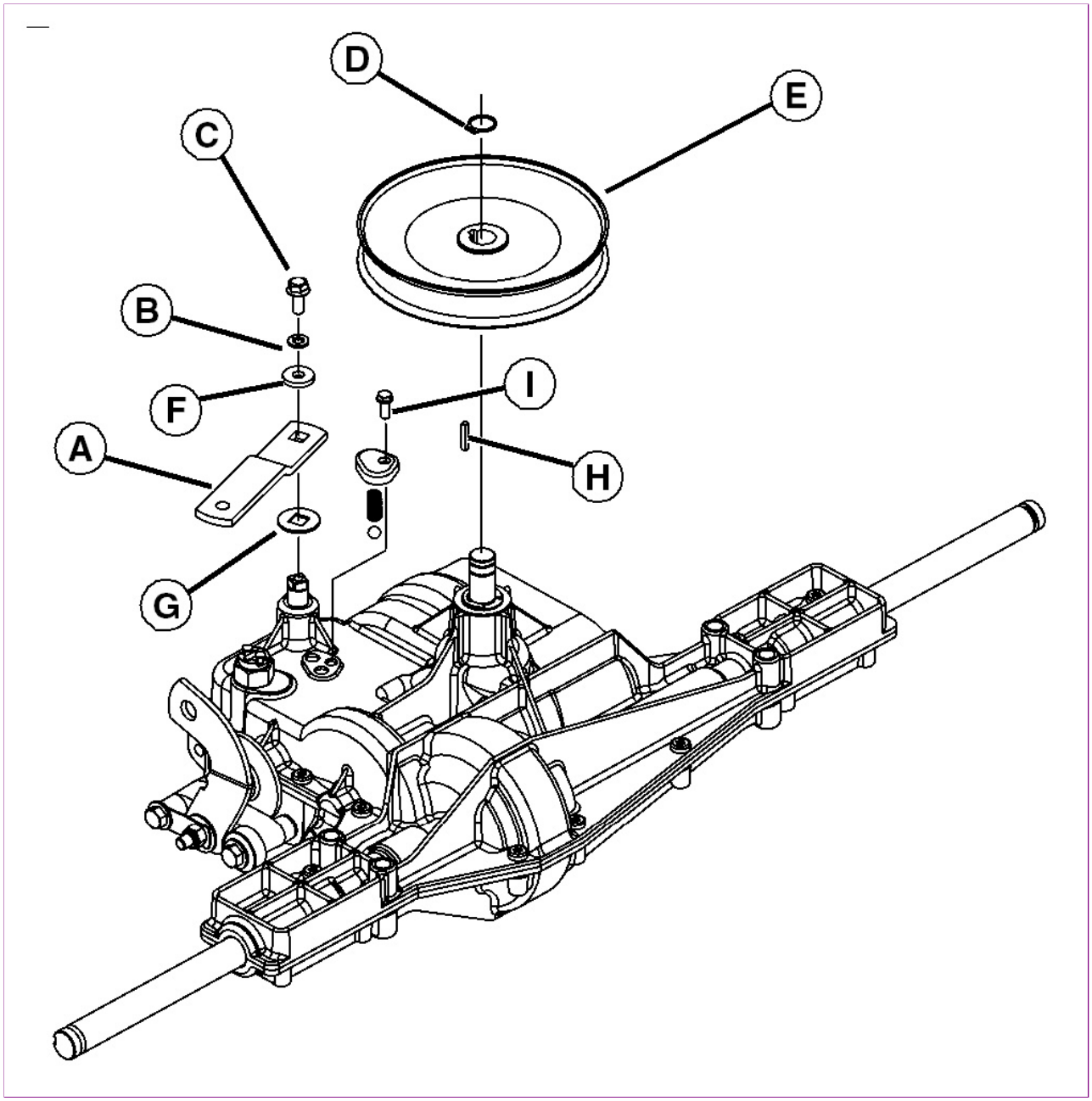
   Install traction drive belt.
4. Install mower deck.
5. Lower machine to surface.
6. Check and adjust shift linkage. See Shift Linkage Adjustment . For brake linkage and clutch linkage adjustment, see Brakes section.

Item	Measurement	Specification
Torque Specifications:		
Front Hanger Cap Screws to Frame		34 N•m 25 lb-ft)
Front Transaxle Cap Screws to Hangers		27 N•m 20 lb-ft)
Rear Axle Cap Screws and Nuts to Frame		34 N•m 25 lb-ft)
Shift Linkage Lock Nut		16 N•m 140 lb-in.)

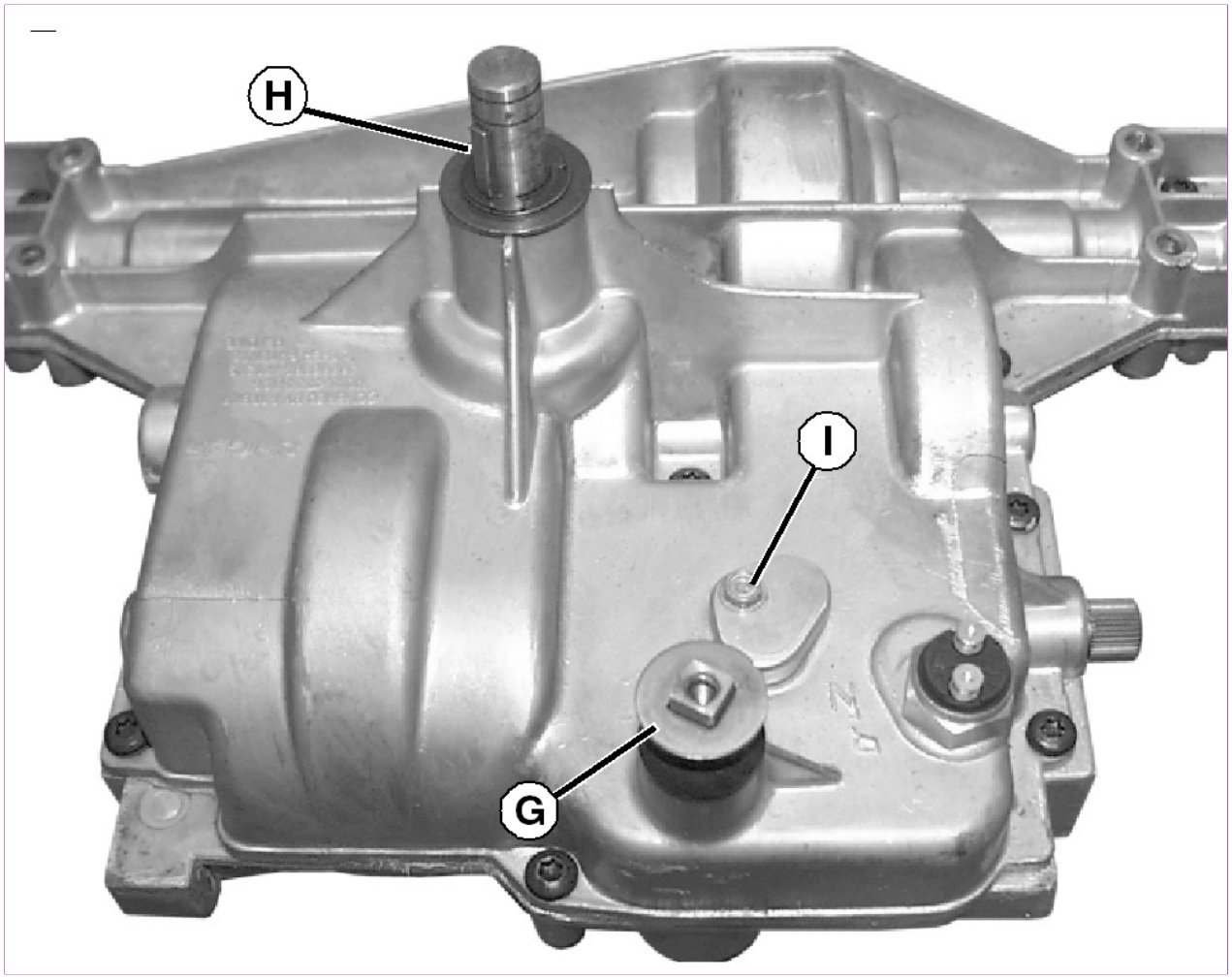
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Transaxle Disassembly

Transaxle Disassembly

Remove Drive Sheave/Shift Arm:



1. Remove drive sheave snap ring (D).
2. Remove drive sheave (E).

3. 

Remove woodruff key (H) from input shaft, and inspect for damage. Replace, if necessary.
4. Remove cap screw (C), lock washer (B), washer (F), shift arm (A) and square hole washer (G).
5. Remove cap screw (I), plate, spring and detent ball.
   - **IMPORTANT:**

     Remember gear sets are a matched set and both must be replaced, even if only one gear in the set is damaged.

     Use a magnet or place a shop cloth over holes and turn transaxle upside-down to catch both detent balls in cloth.
   - Inspect detent balls and springs for wear or damage. Replace components as necessary, but do not install until assembly, much later in this section.

Remove Brake And Repair Gear Assembly:

1. **IMPORTANT:**

   Check brake components for wear. Check for brake disc contacting the case and/or brake lever contacting its mounting bracket, top or bottom. If so, all three components must be replaced.

Remove brake assembly. See Brake Removal and Installation - Gear in the Brakes section.

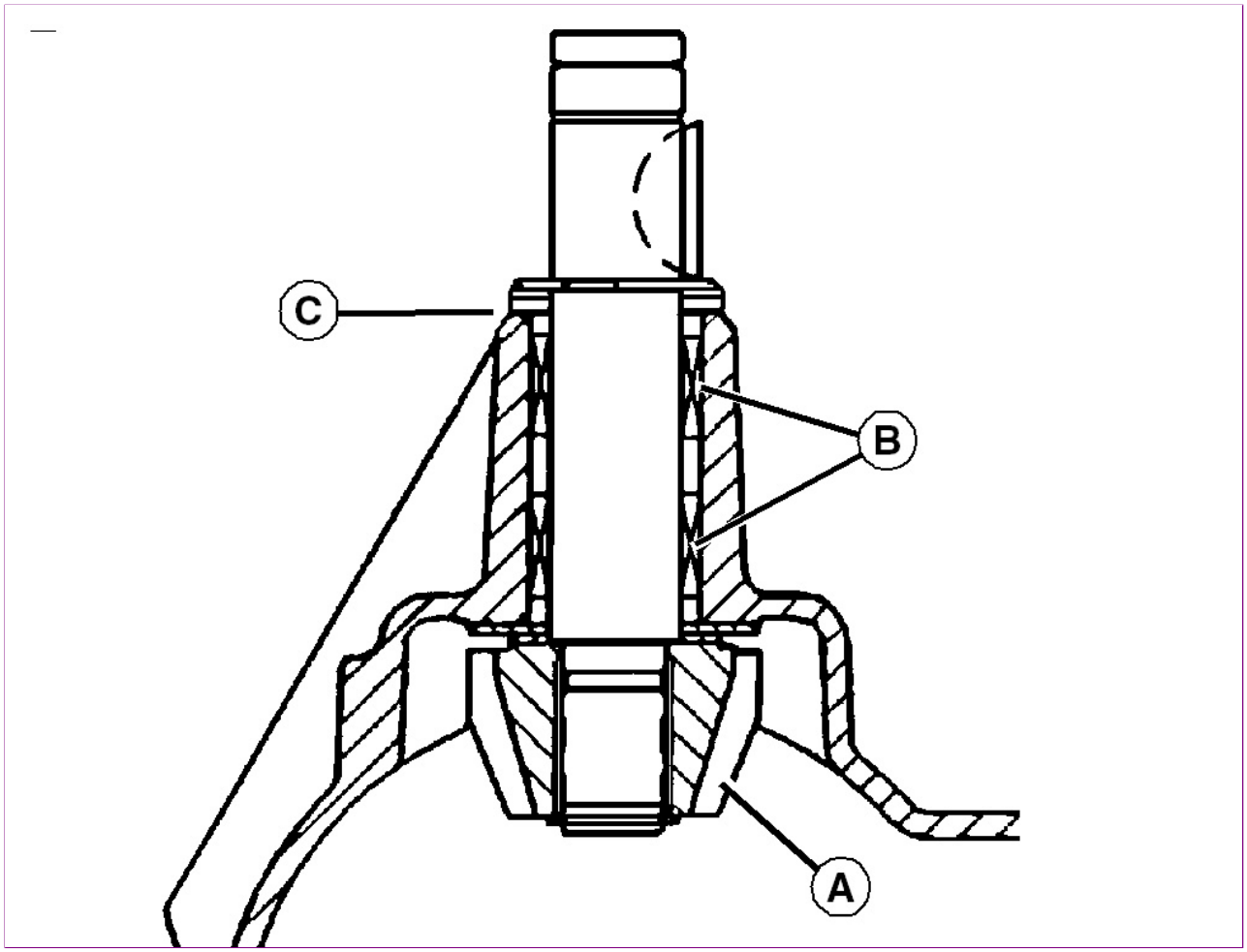
Separate Transaxle Housing Case Halves:

1. *NOTE:*

   Brake assembly should be removed already.

Remove all transaxle housing socket head screws.
2. Carefully separate transaxle housing into upper and lower case halves.
3. Inspect overall condition of components without removing any of them. Visually target worn or damaged parts for replacement.
4. Remove most of the grease without removing any components.

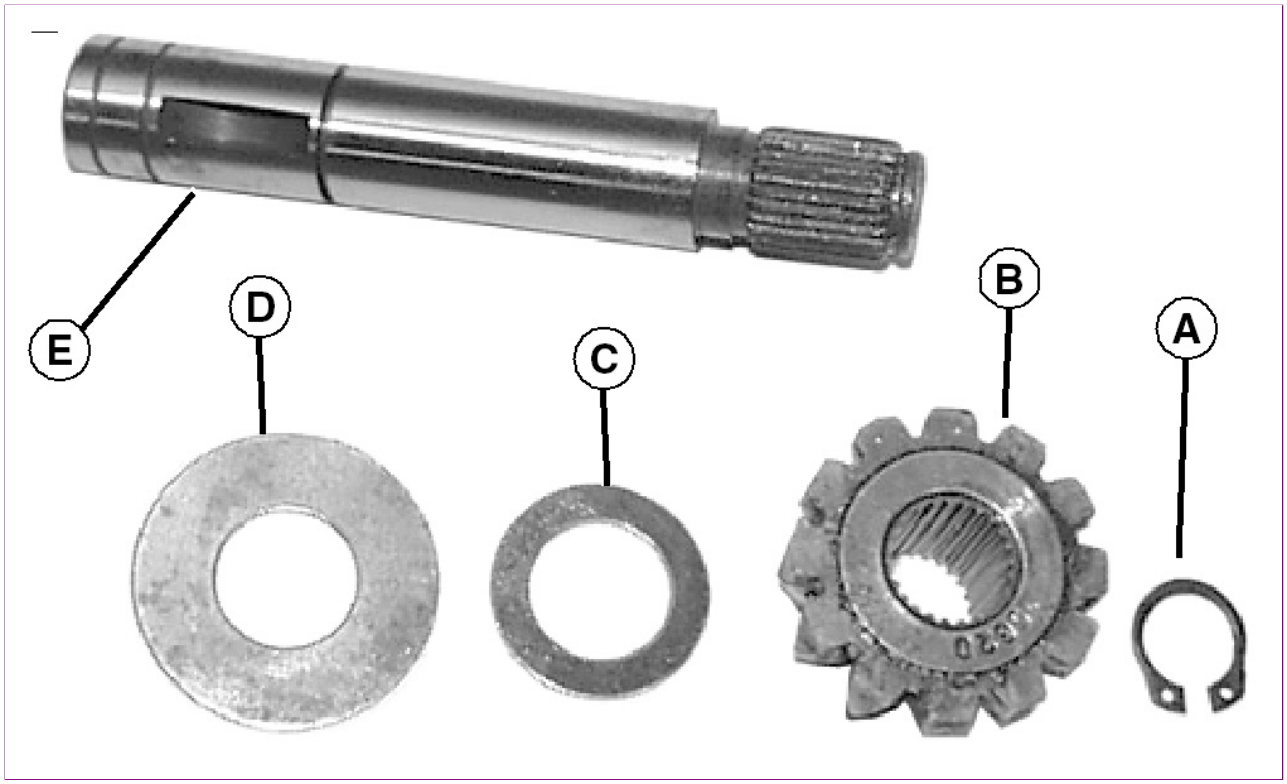
Inspect Input Shaft/Pinion Gear Assembly:

1. 

Visually check overall condition of assembly, including the key, keyway, and drive sheave hub keyway.
2. Check condition of pinion gear (A), look for wear, pitting, broken teeth, etc.
3. Grasp the input shaft and try to rock it left or right inside case housing. If movement is noticeable, needle bearings (B) inside diameters will need to be measured once shaft is removed.
4. To measure input shaft air gap, push on the end of the input shaft to seat pinion gear against housing.
5. Use a feeler gauge to measure go-no-go air gap between shim (C) and the top surface of the input boss:
    - Go air gap should be **0.25 mm (0.010 in.) or less**
    - No-go measurement is anything greater than **0.25 mm (0.010 in.)**
6. If measurement results in a no-go reading, shim thickness needs to be changed or worn components must be replaced.

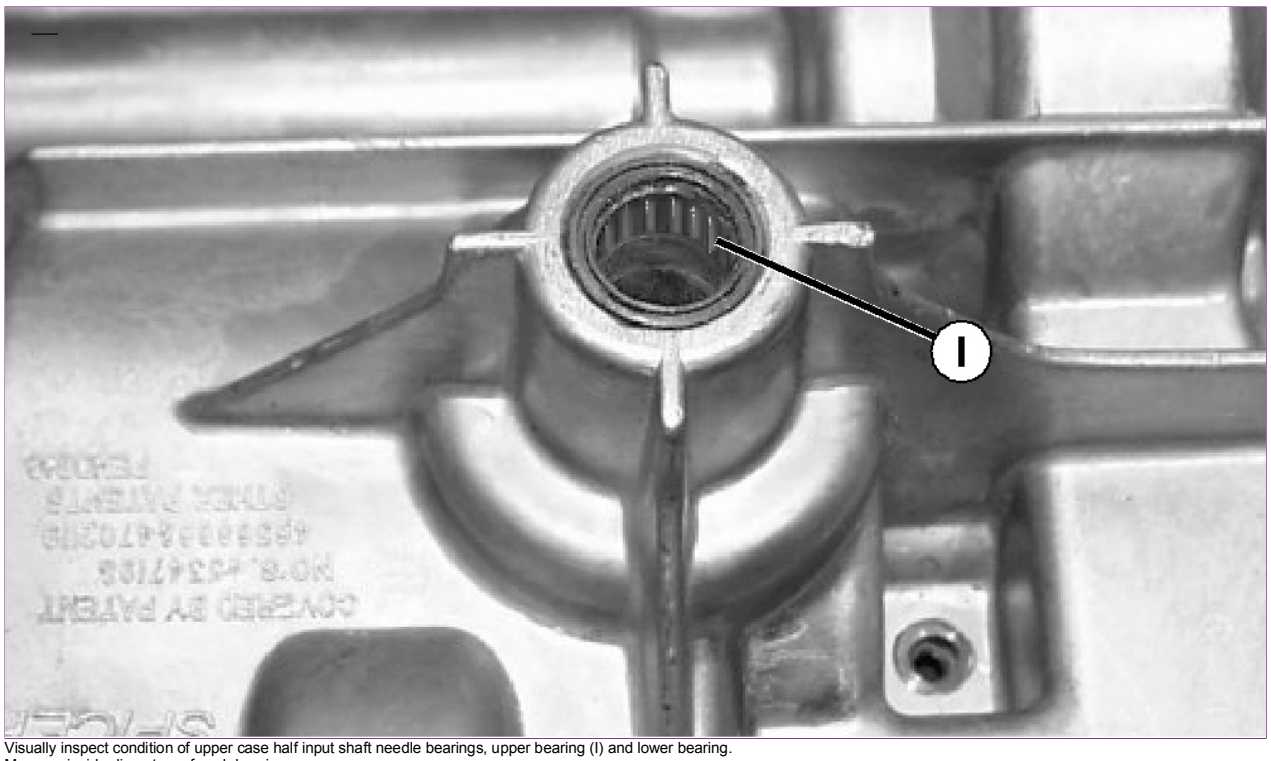
Disassemble Input Shaft/Pinion Gear Assembly:

1. Remove E-ring, shim (small washer), washer, and input shaft from case.



2. Remove snap ring (A), bevel pinion gear (B), small washer (C), and large washer (D) from input shaft (E).
3. **IMPORTANT:**

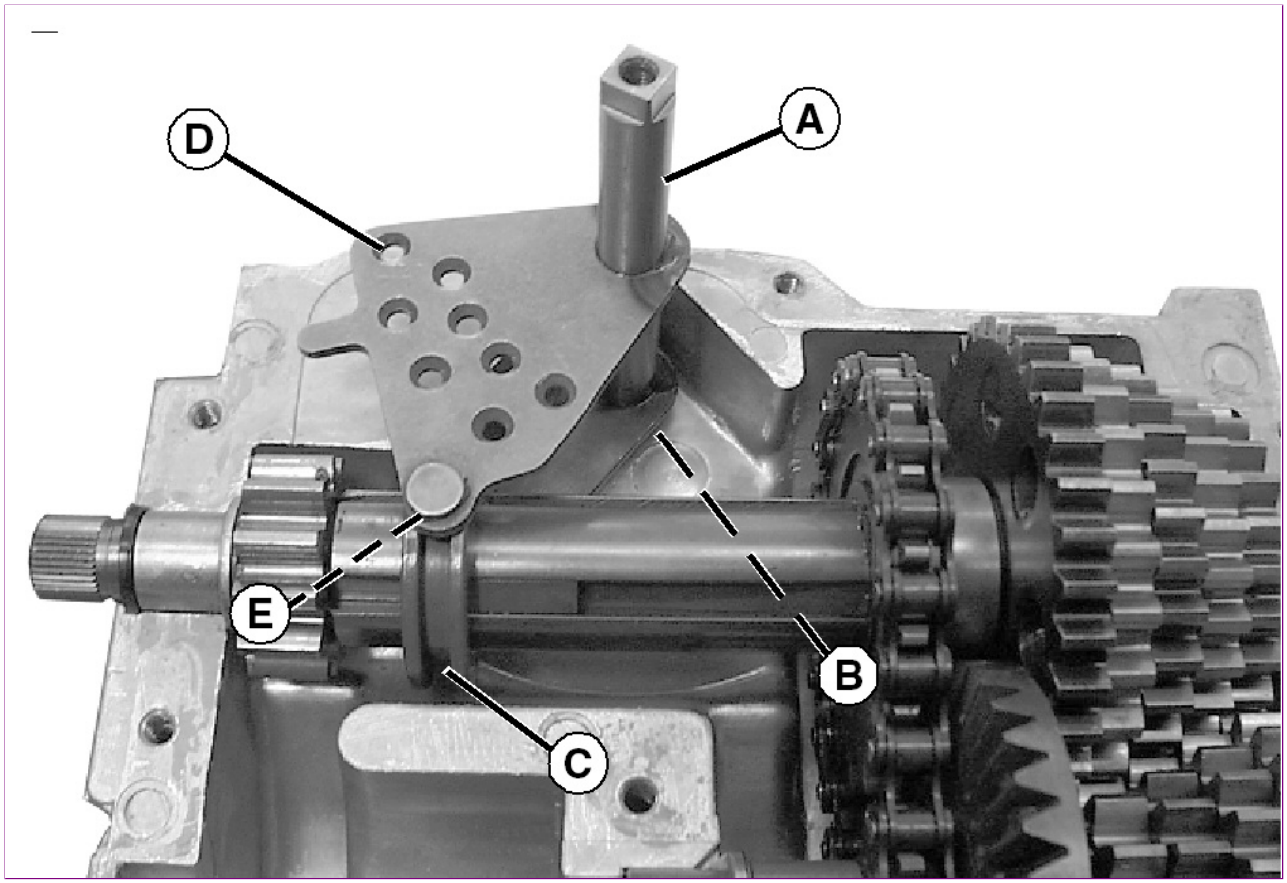
   Remember gear sets are a matched set and both must be replaced, even if only one gear in the set is damaged.



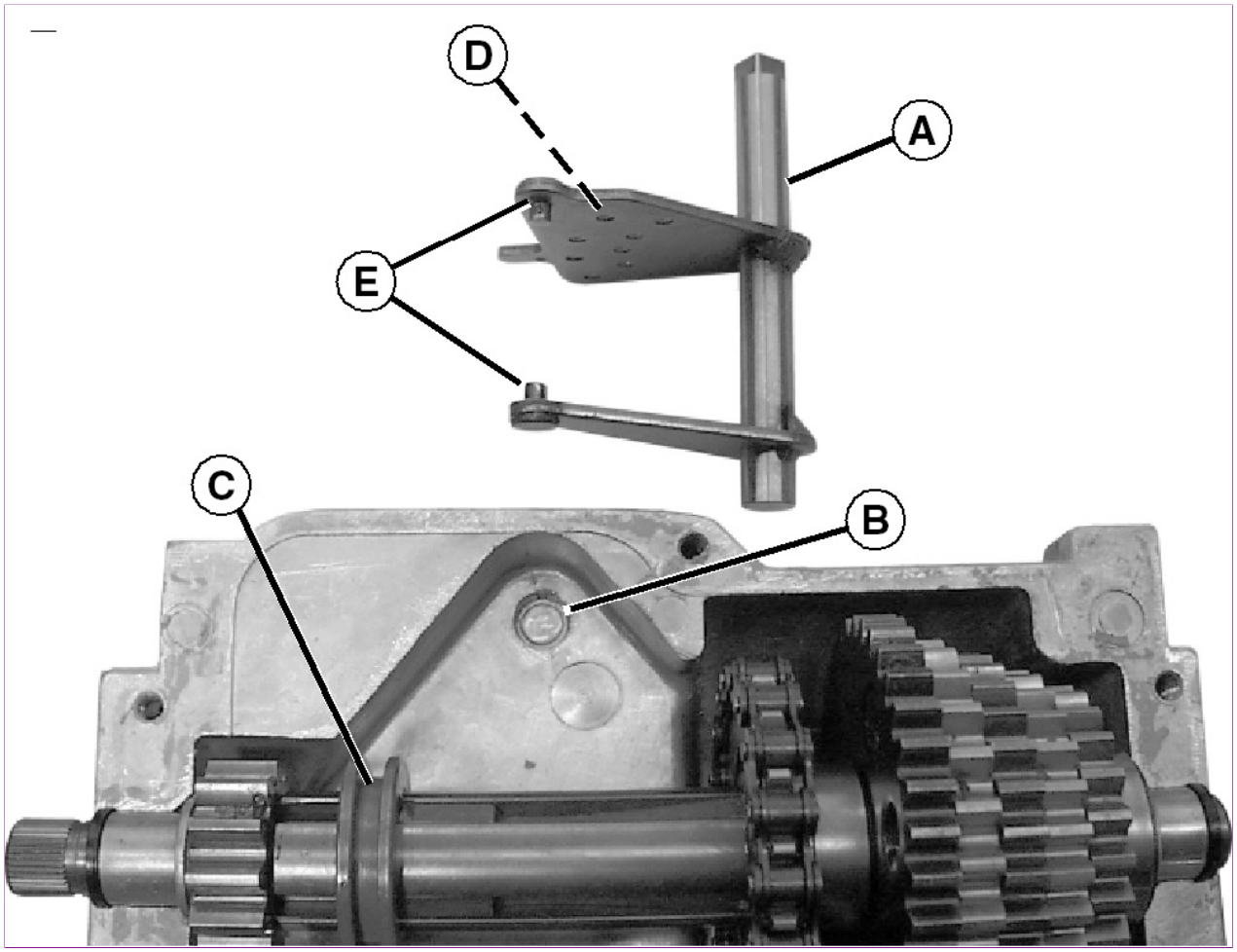
Visually inspect condition of upper case half input shaft needle bearings, upper bearing (I) and lower bearing.

4. Measure inside diameters of each bearing:
   - Go measurement should be 15.89 - 15.92 mm (0.6255 - 0.6269 in.)
   - No-go measurement is anything greater than 15.92 mm (0.6269 in.)
5. If measurement results in a no-go reading for either bearing, replace both bearings (Ordered As Set With Special Grease) by carefully pressing them from case half bore without damaging bore.
6. Clean and inspect bore. If scratched or deformed, replace upper case half.

Disassemble Shifter Shaft Assembly:

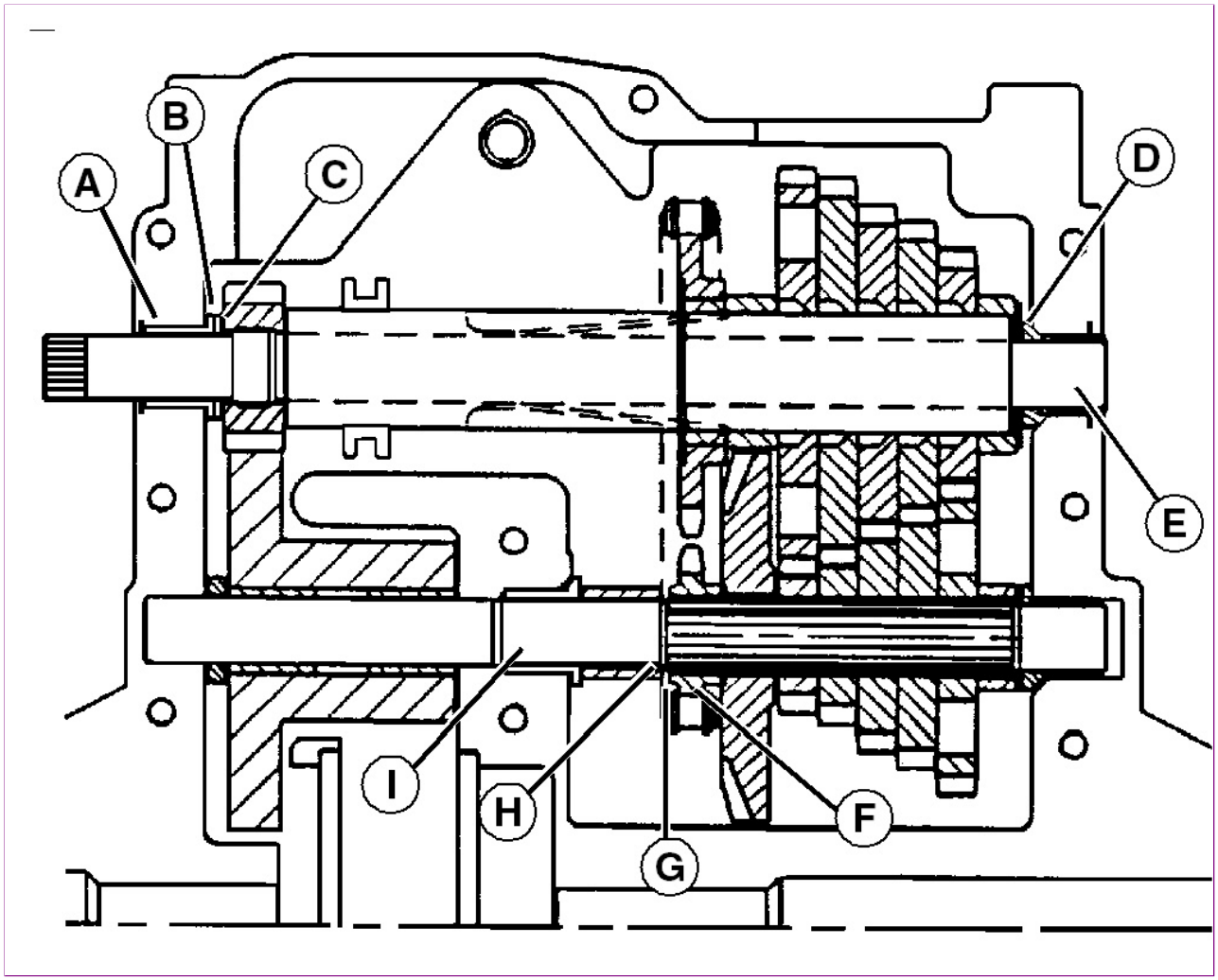
1. 

Lift shifter shaft assembly (A) from lower case half mounting hole (B) and groove of shift collar (C).



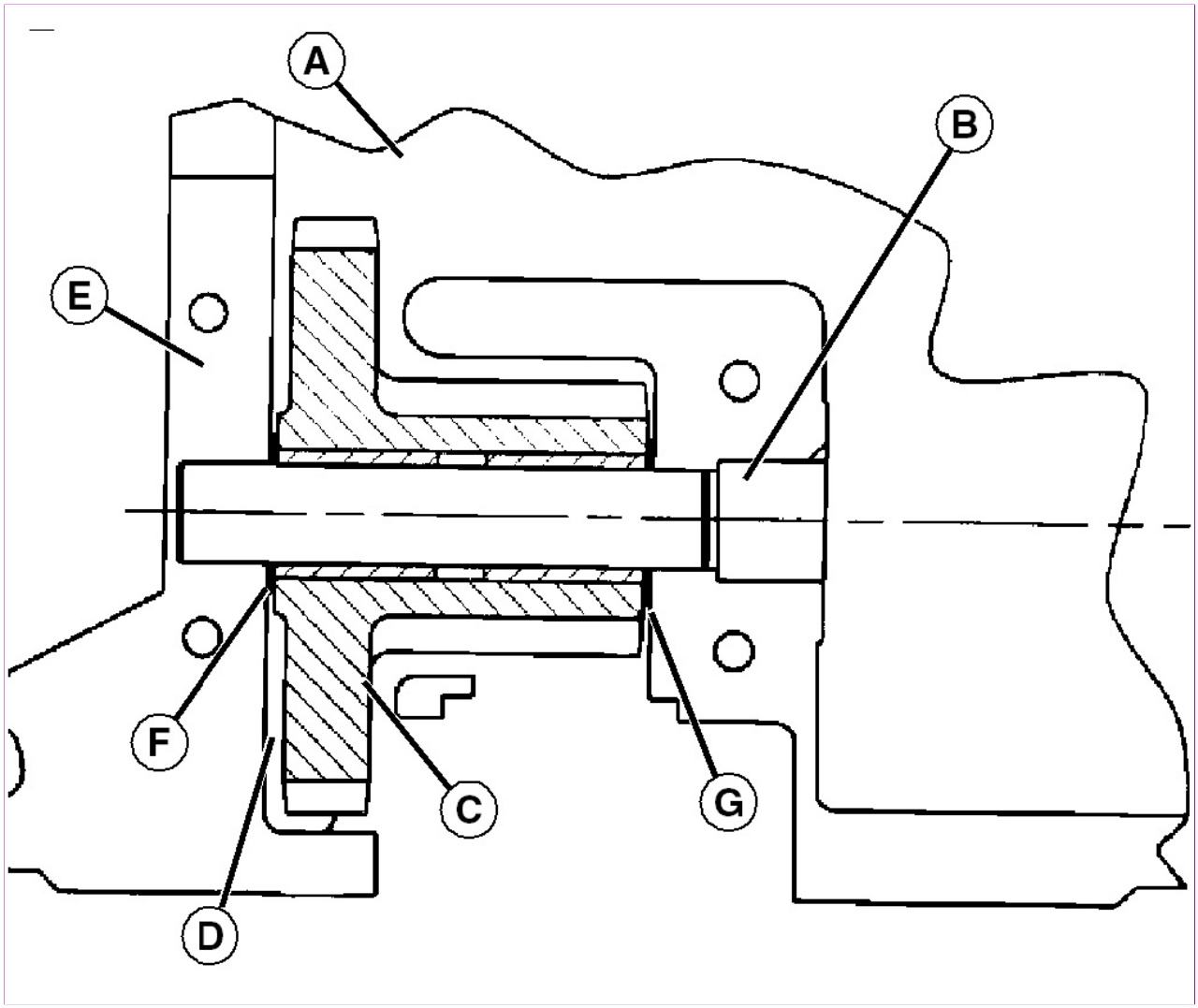
2. Clean shifter shaft assembly once removed.
3. Inspect condition of detent holes (D), shift pins (E), overall shifter shaft assembly, lower case half mounting hole, and shift collar.
4. If any part of shifter shaft assembly is worn or damaged, replace it; also, the rubber boot, and the detent balls and detent springs.
5. If lower case half mounting hole is worn or damaged, replace the case half.
6. If shift collar is worn or damaged, replace it when intermediate shaft assembly is disassembled.

Inspect Drive/Intermediate Shaft Assemblies:



1. Visually check overall condition of assemblies, including gears for wear, pitting, broken teeth, etc.
2. For the drive shaft assembly (I), use a feeler gauge to measure go-no-go air gap (G) between side surface of small gear (F) and side surface of shim washer (H):
   - Go air gap should be 0 - 0.20 mm (0 - 0.008 in.)
   - No-go air gap is anything greater
3. For the intermediate/brake shaft assembly (E), use a feeler gauge to measure go-no-go air gap (B) between end surface of flange bearing (A) and washer (C):
   - Go air gap should be 0 - 0.25 mm (0 - 0.010 in.)
   - No-go air gap is anything greater
4. If either or both measurements result in a no-go reading, shim washers (D and H) need to be added or worn components need to be replaced.

Inspect Idler Combination Gear Assembly:

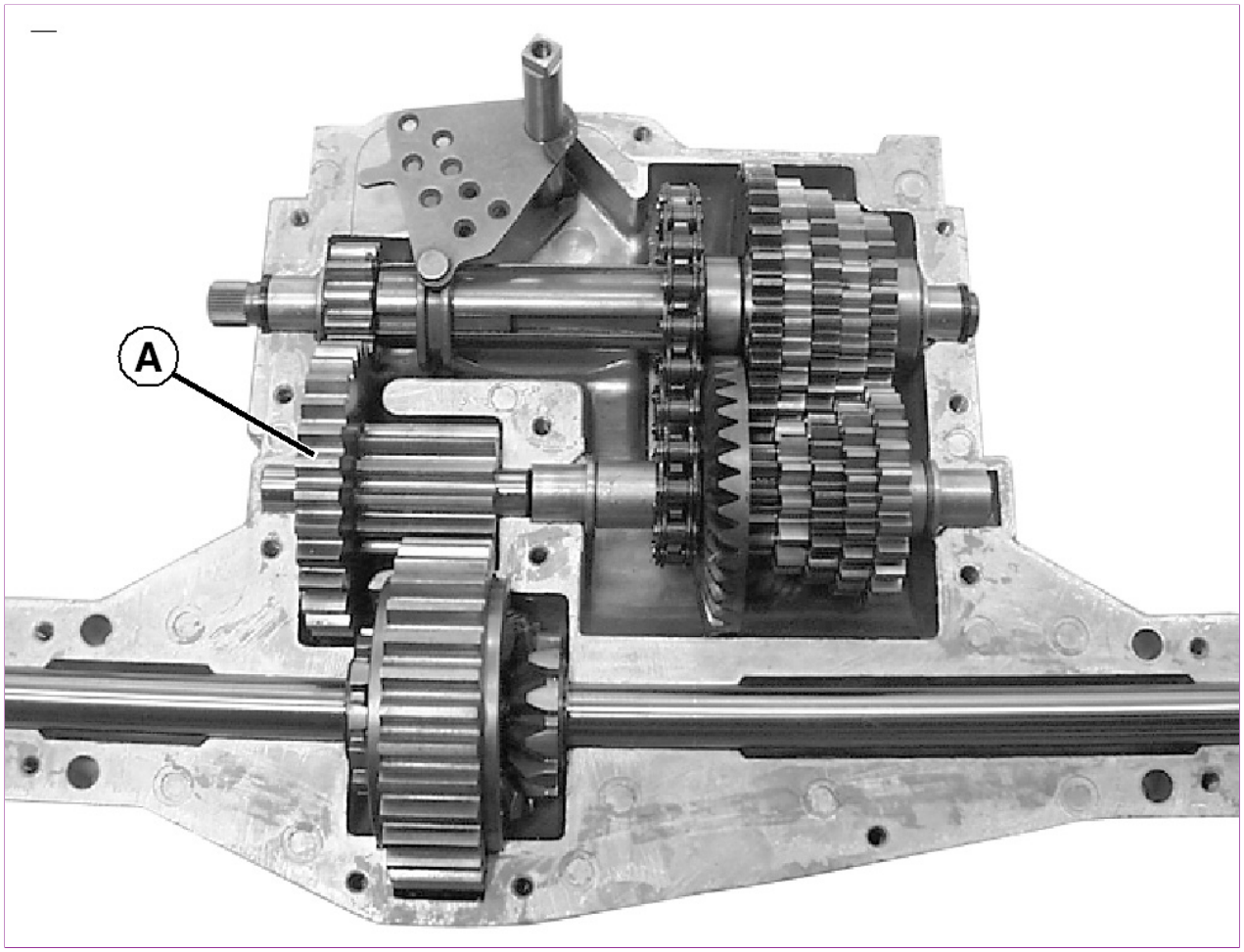


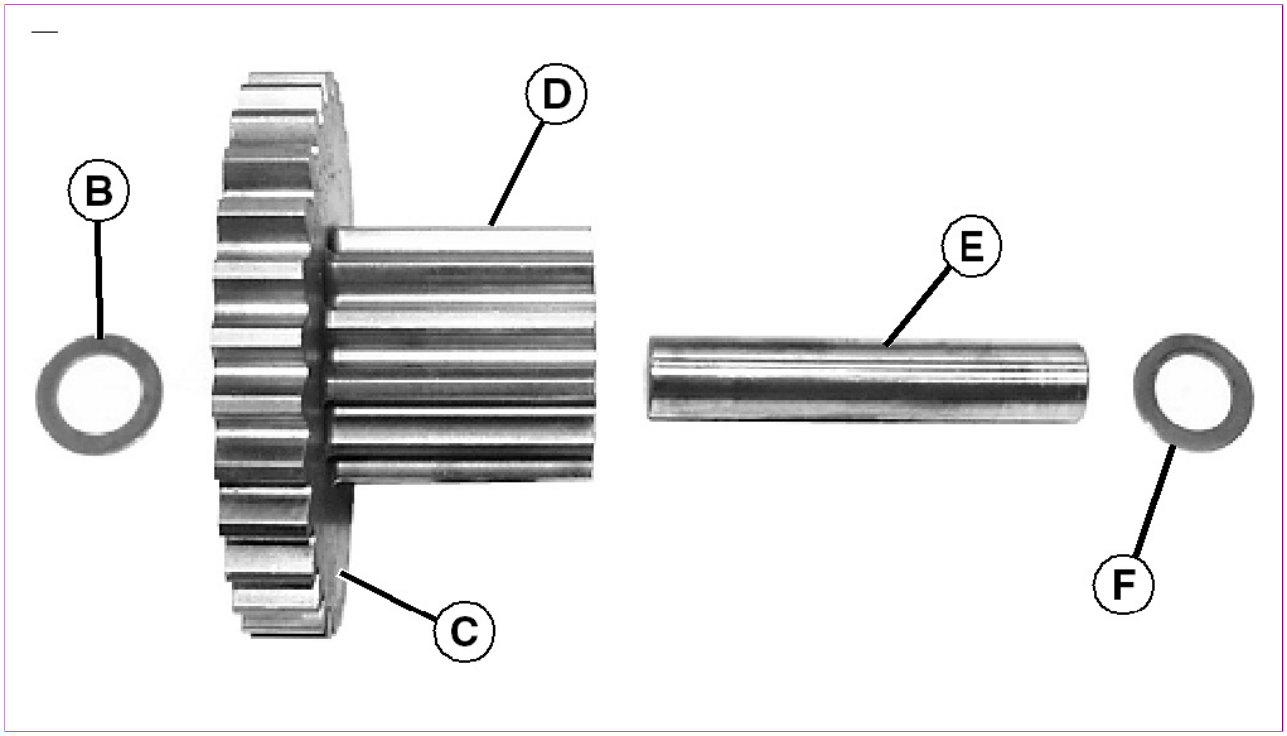
1. Visually check overall condition of lower housing assembly (A), including shaft (B) and bushings, combination gear (C) for wear, pitting, broken teeth, etc.
2. Use a feeler gauge to measure go-no-go air gap (D) between end surface of combination gear and side surface of case half (E):
   - No-go air gap is **anything greater than** 0.63 mm (0.025 in.)
   - Go air gap should be 0.33 - 0.63 mm (0.013 - 0.025 in.)
3. If measurement results in a no-go reading, worn and damaged components need to be replaced.

NOTE:

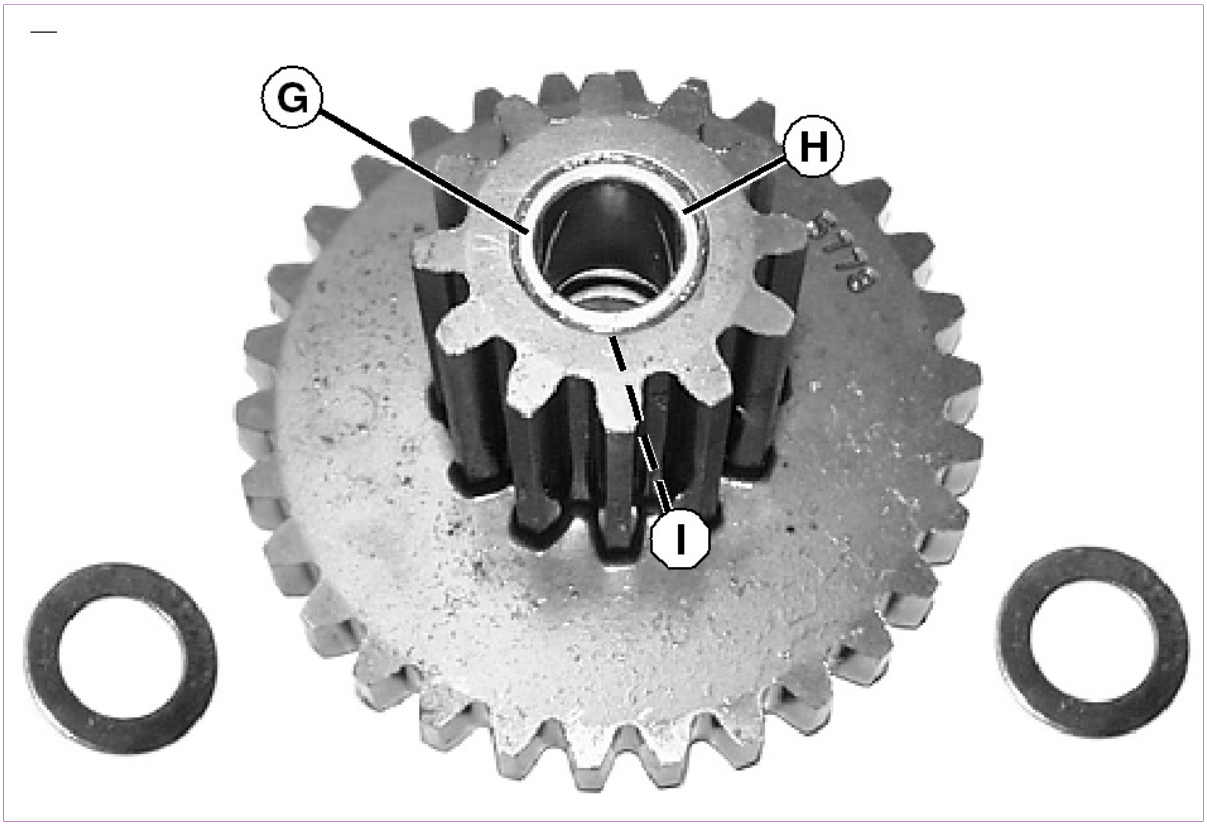
Make note of washer (F), and shim washer (G) if removal of components is necessary.

Disassemble Idler Combination Gear Assembly:

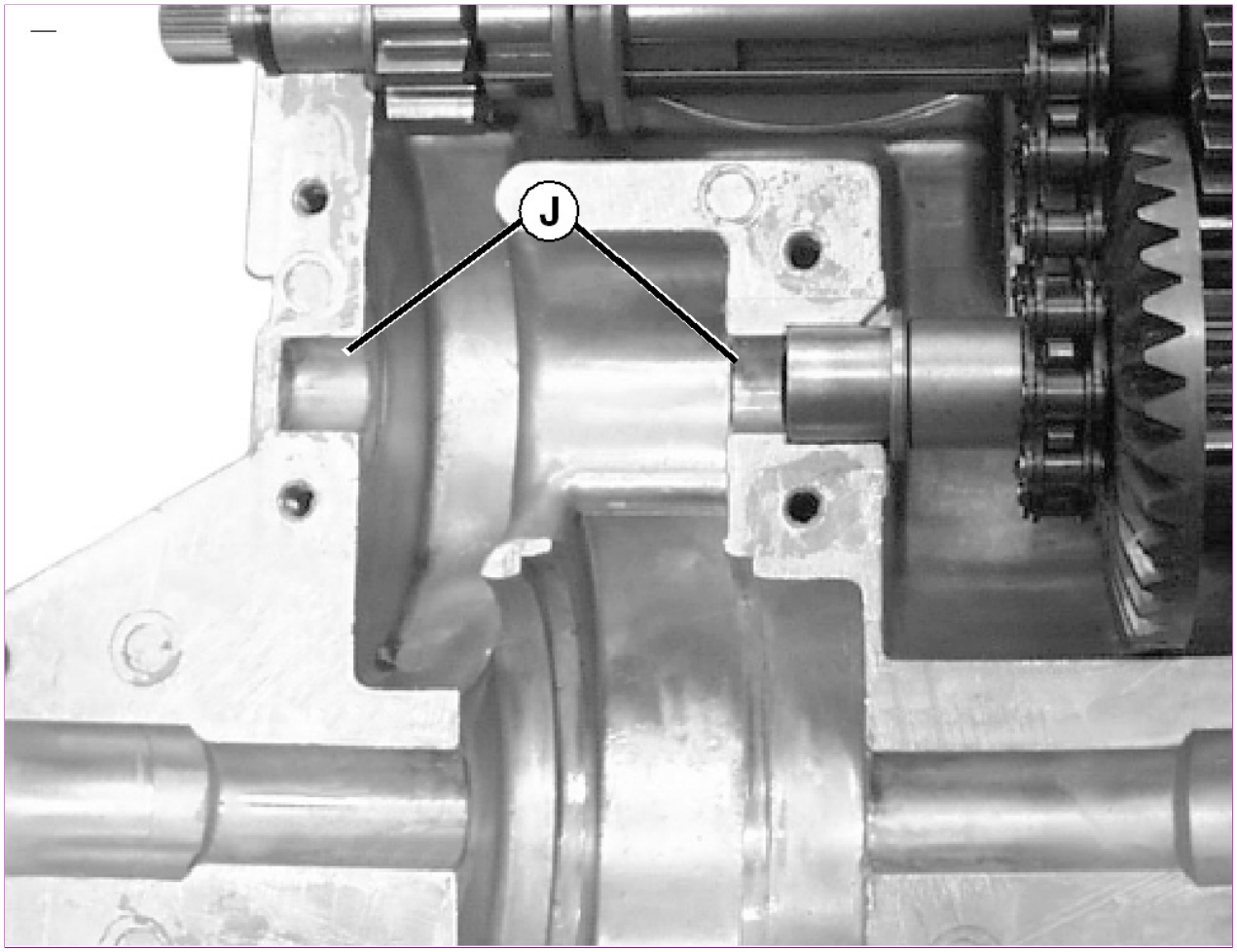
1. 

Lift idler combination gear assembly (A) from lower case half.
2. Clean components individually once disassembled.
3. 

Separate and inspect assembly components:
   - Washer (B) should be 0.632 x 1.00 x 0.046 in., not scored nor discolored (Burned)
   - Narrow combination gear (C) should have 30 good teeth and wide combination gear (D) should have 12 good teeth, not scored nor discolored (Burned)

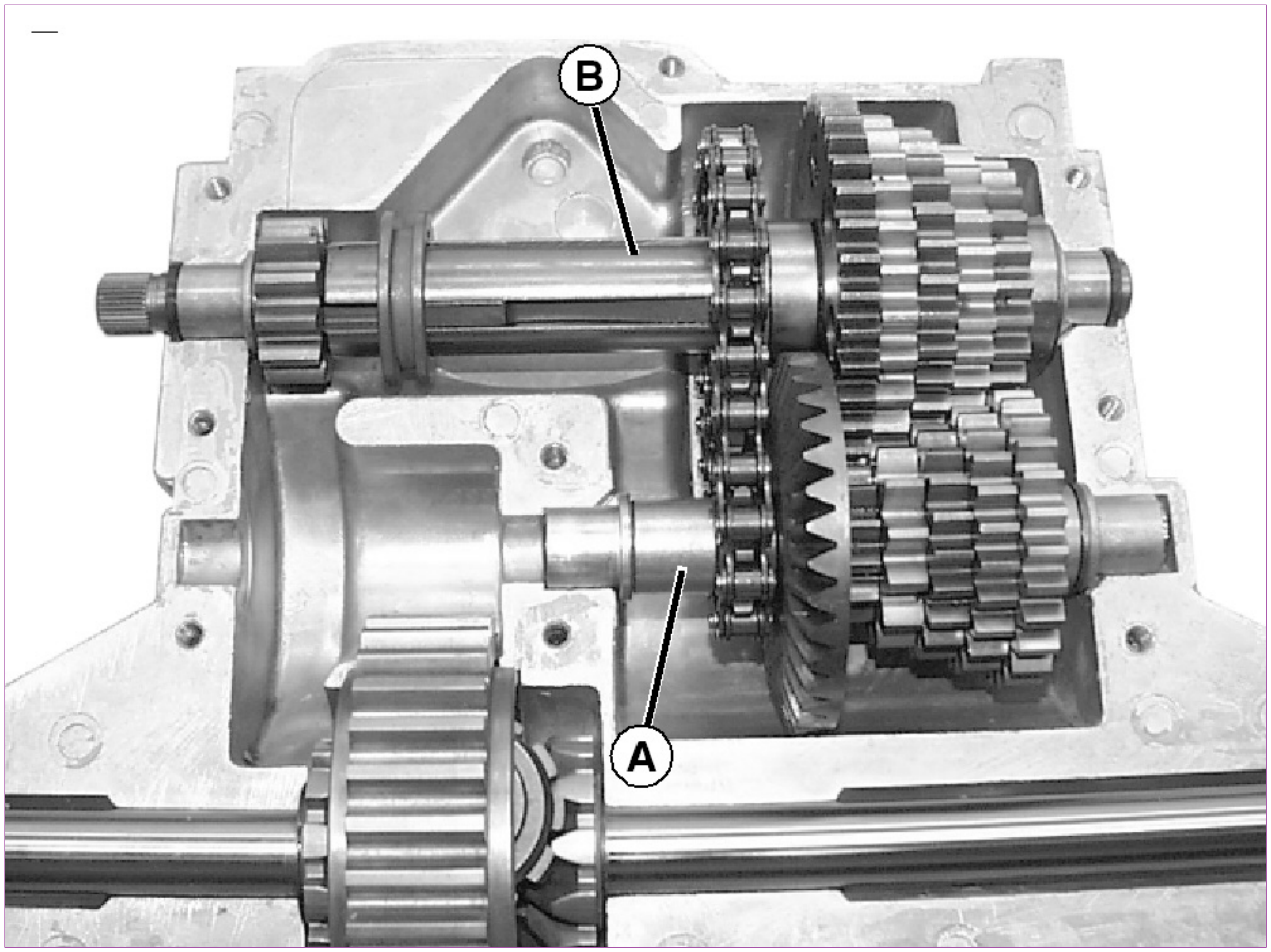
- Idler shaft (E) should be smooth and not scored, pitted, nor discolored (Burned)
- Shim washer (F) is found in shim kit
- 

  Inside (G) and outside (H) bearings are press fit and should not be scored nor discolored (Burned)
- Gear bore (I) should not be scored or discolored (Burned). Replacement gear has bronze sleeve bearings (2), a new shaft is also recommended whenever new gear is ordered

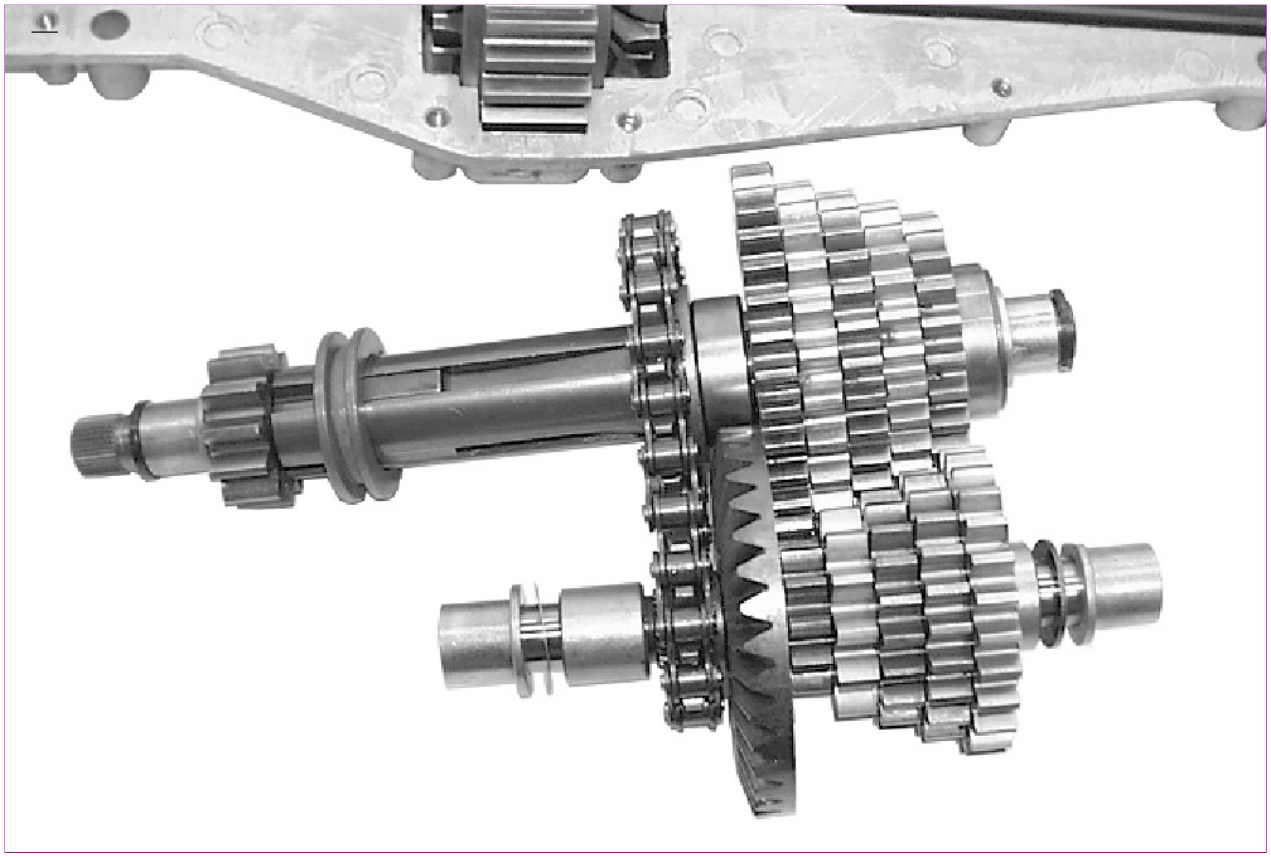
4. 

Inspect lower and upper case halves and idler shaft surfaces (J) for excessive scoring or wear. Replace case halves or idler shaft as necessary.
   - The housings to idler shaft is an interference fit that grips the idler shaft to prevent it from rotating

Disassemble Drive/Intermediate Shaft Assemblies:



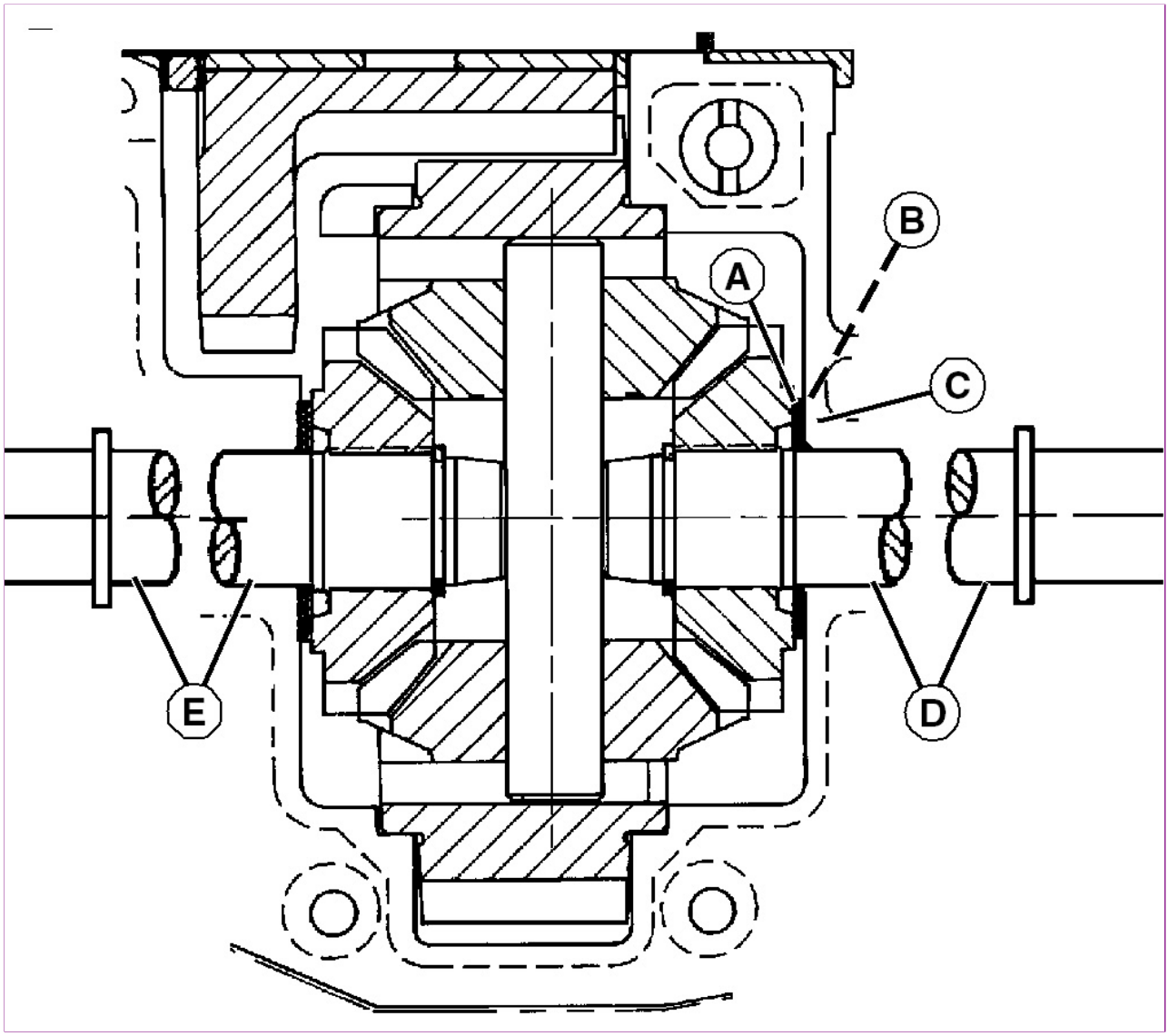
1. Lift both drive (A) and intermediate shaft (B) assemblies out together.

2. 
   Carefully remove drive shaft assembly components (Bottom Row) from drive shaft. Be sure to note each components orientation to its neighbor and to the drive shaft. You may want to mark the same side of each component to help keep the orientation correct.
3. Clean components individually once disassembled.
4. Inspect each component closely for wear, scoring, cracks, chips, and broken teeth or splines.
5. Do the same for the intermediate shaft and its components (Top Row).
6. **IMPORTANT:**

   Remember gear sets are a matched set and both must be replaced, even if only one gear in the set is damaged.

   Replace components as necessary.

Inspect Differential/Axle Shafts Assembly



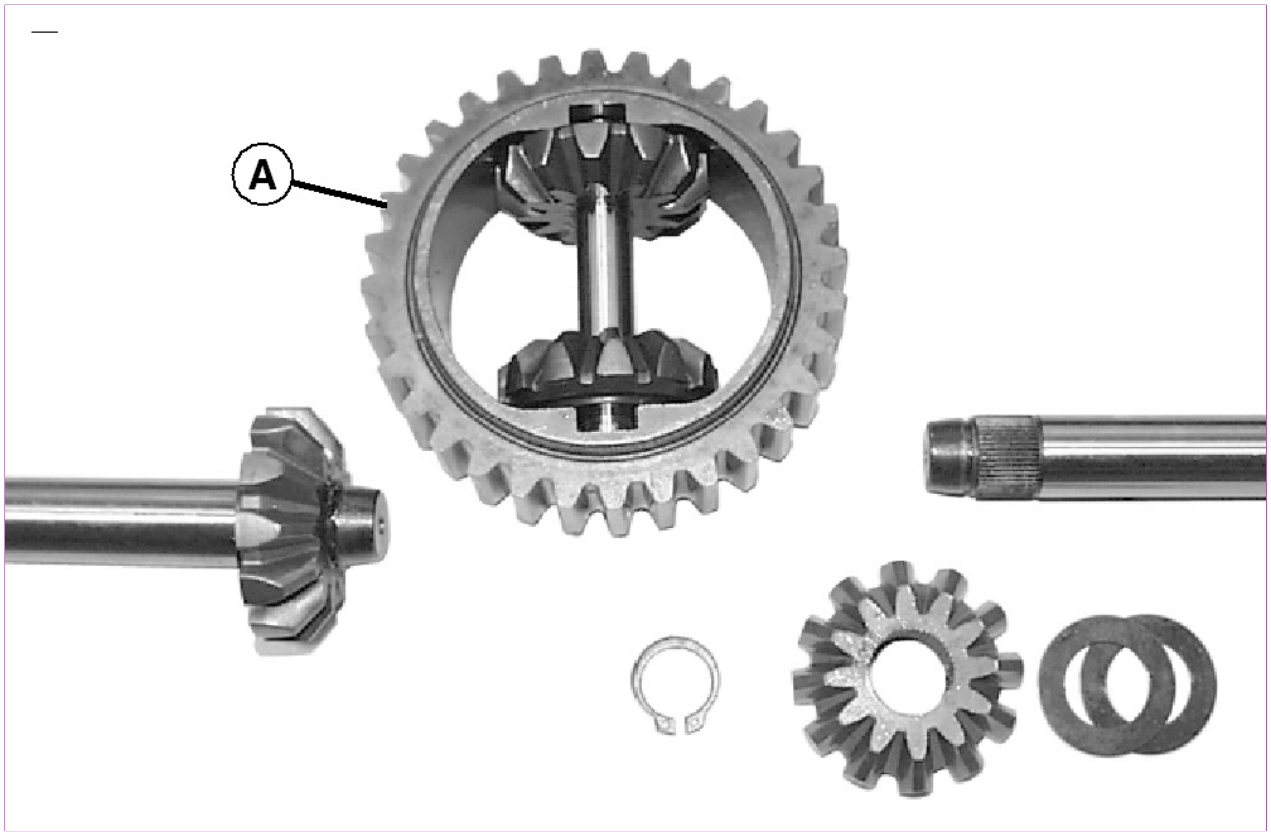
1. Visually check overall condition of assembly.
2. Use a feeler gauge to measure go-no go air gap (B) between side surface of shim washer (A) and side surface of lower case (C):
   - Go: Air gap should be 0.18 - 0.30 mm (0.007 - 0.012 in.)
   - No-go: Air gap is 0.33 mm (0.013 in.) or greater
3. *NOTE:*

   Right hand long (D) and left hand (E) axles shown for reference purposes.

   If measurement results in a no-go reading, worn or damaged components must be replaced.

Disassemble Differential/Axle Shafts Assembly:

1. Put inward pressure on both axles as you lift differential assembly from lower case.



2. Carefully remove axle shaft assembly components from ring gear (A). Be sure to remember each components orientation to its neighbor and to the ring gear. You may want to mark the same side of each component to help keep the orientation straight.
3. Clean components individually once disassembled, be sure to remove all sealant material from upper and lower case halves.
4. Inspect each component (Especially Both Upper And Lower Case Halves) closely for wear, scoring, cracks, chips, or discoloration (Burnt). Replace components as necessary.
5. Replace seals every time transaxle housing has been separated.

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Transaxle Assembly

Transaxle Assembly

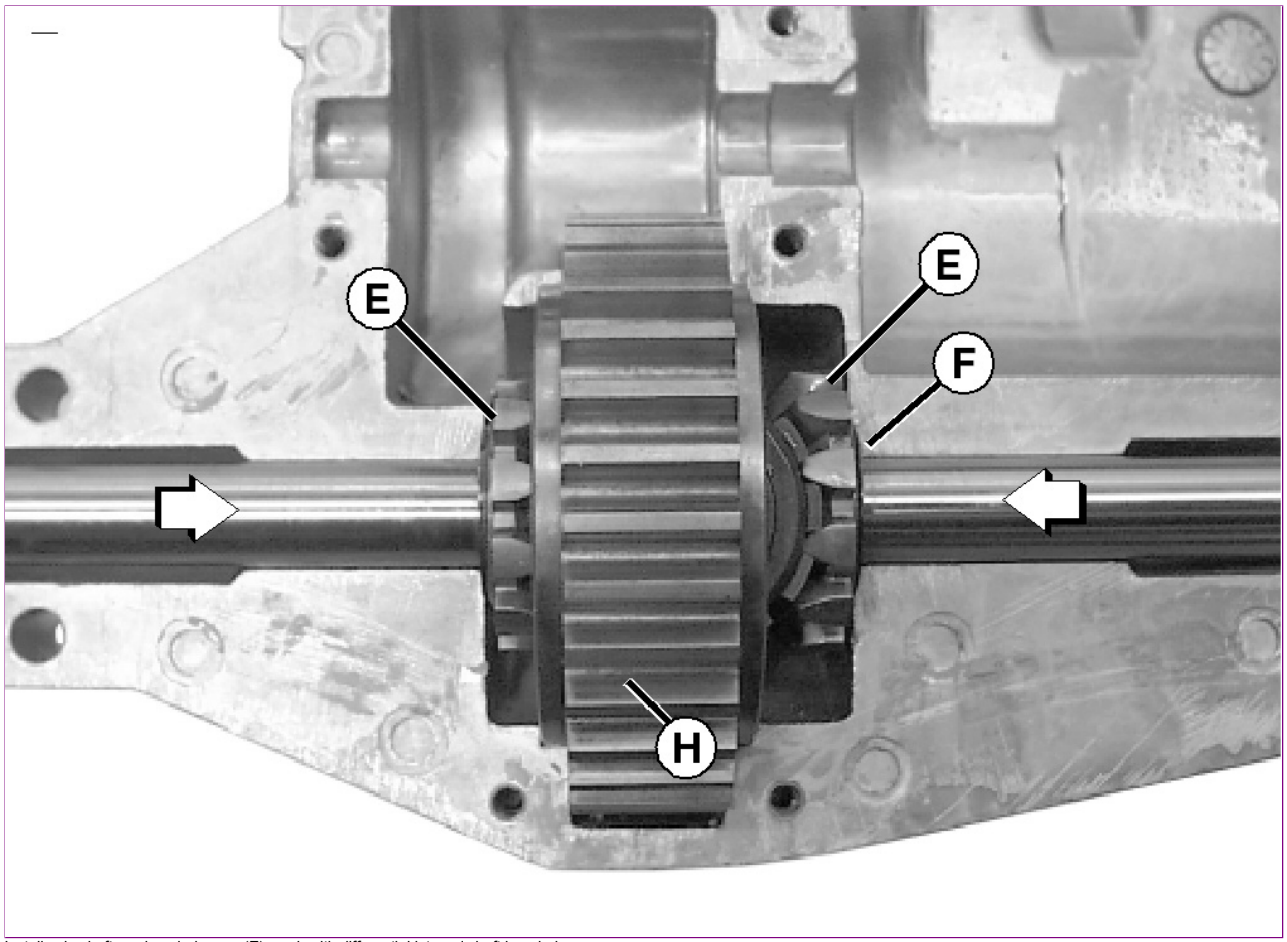
Assemble Differential/Axle Shafts Assembly:

IMPORTANT:

Remember gear sets are a matched set and both must be replaced, even if only one gear in the set is damaged.

1. Assemble left-hand, short axle with splined, beveled gear facing the ring gear.
2. Assemble right-hand, long axle with splined, beveled gear facing the ring gear and shim washers assembled in combination of thicknesses to obtain specified air gap.
3. Assemble internal shaft with beveled gears facing each other.
4. Install internal shaft assembly in slots of ring gear and push beveled gears away from each other so they are ready to mesh with both axle beveled gears.
5. *NOTE:*

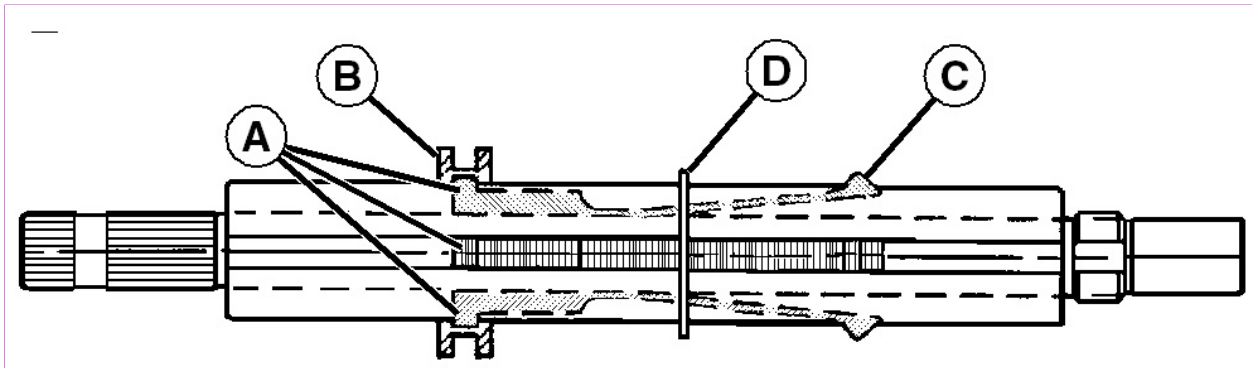
   Beveled gears are offset in ring gear toward right side.

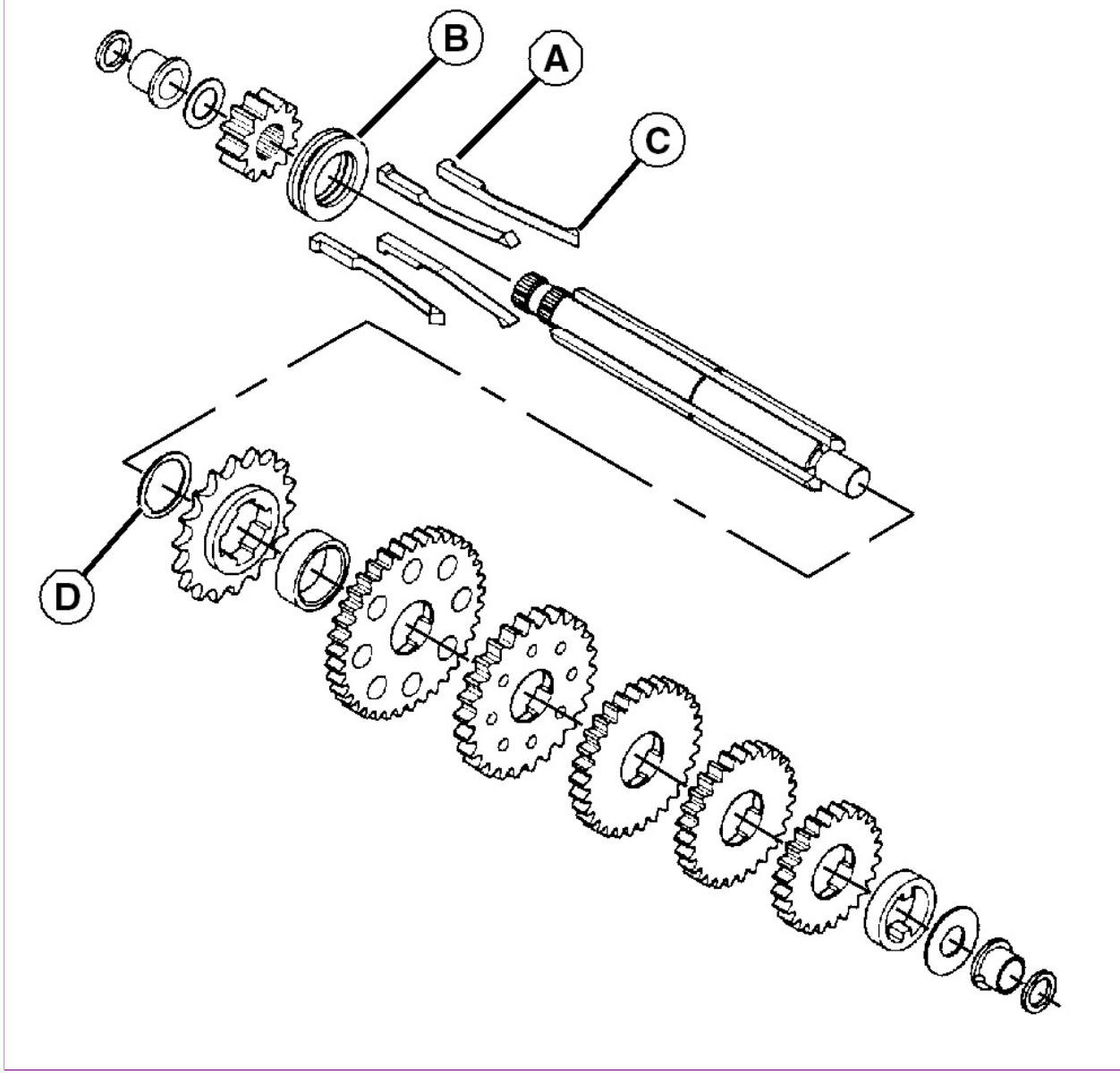


Install axle shafts so beveled gears (E) mesh with differential internal shaft beveled gears.

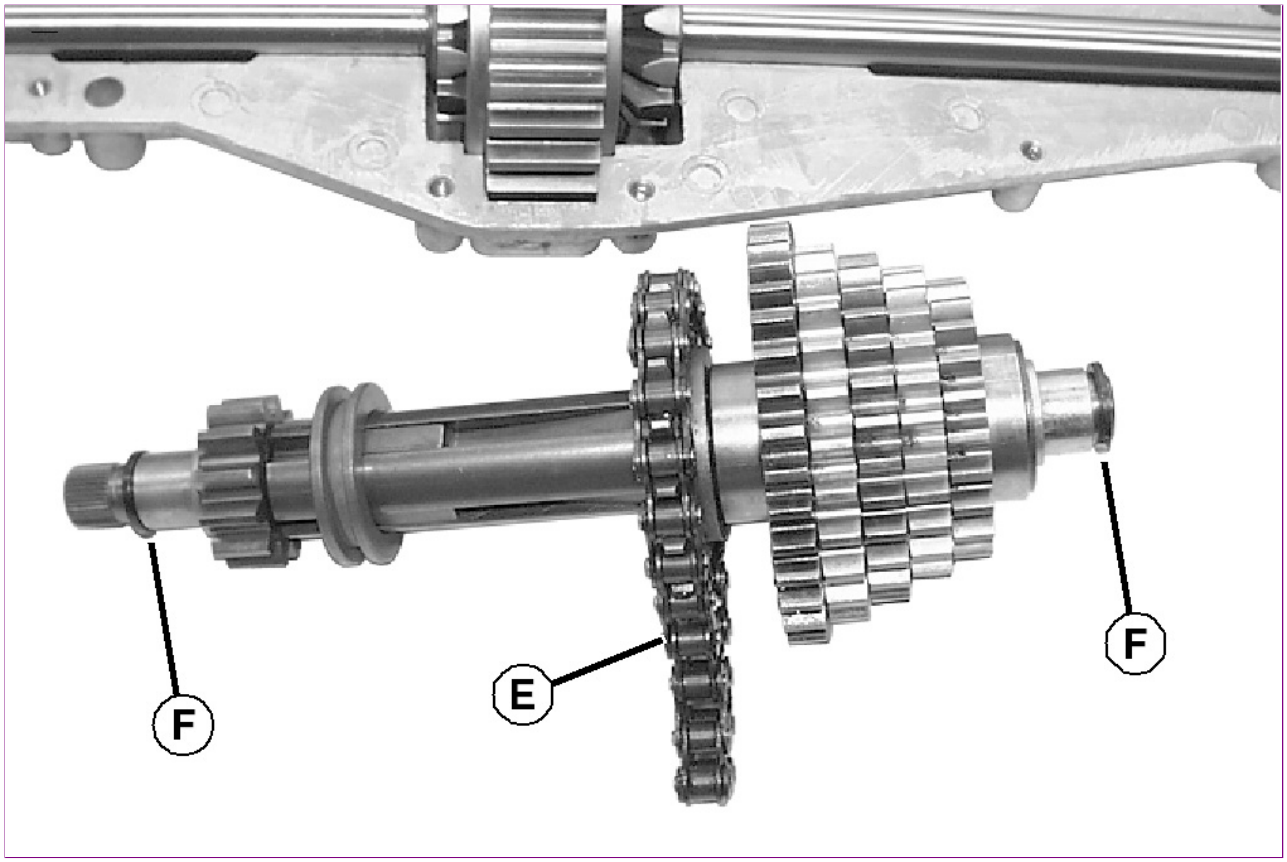
6. Keep inward pressure on both axles as you install differential assembly in lower case housing.
7. Carefully install new axle shaft seals and seat them in their lower case housing grooves.
8. Measure air gap between shim washers (F) and side of housing (H). If air gap meets specification, go to next step. If air gap does not meet specification, remove right axle shaft and add other shim washer combinations until air gap in within specification.

Assemble Drive/Intermediate Shaft Assemblies:



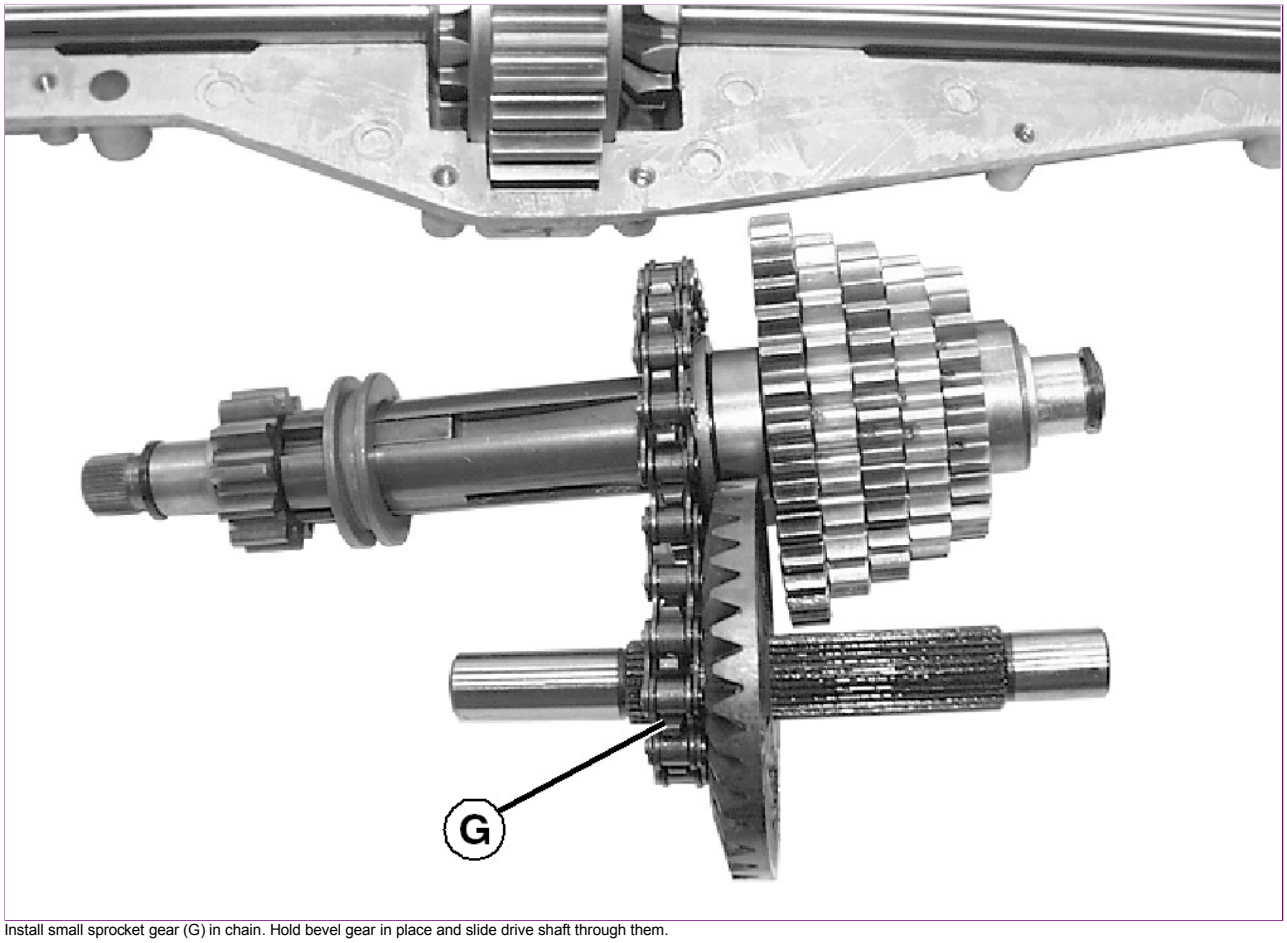


1. Install four keys in grooves of intermediate shaft and hold them so internal shift collar anchors (A) will seat in internal groove of collar (B) as it is installed on the shaft.
2. Slide shift collar and keys against retaining ring and compress locking ramps/lugs (C) to clear retaining ring (D).

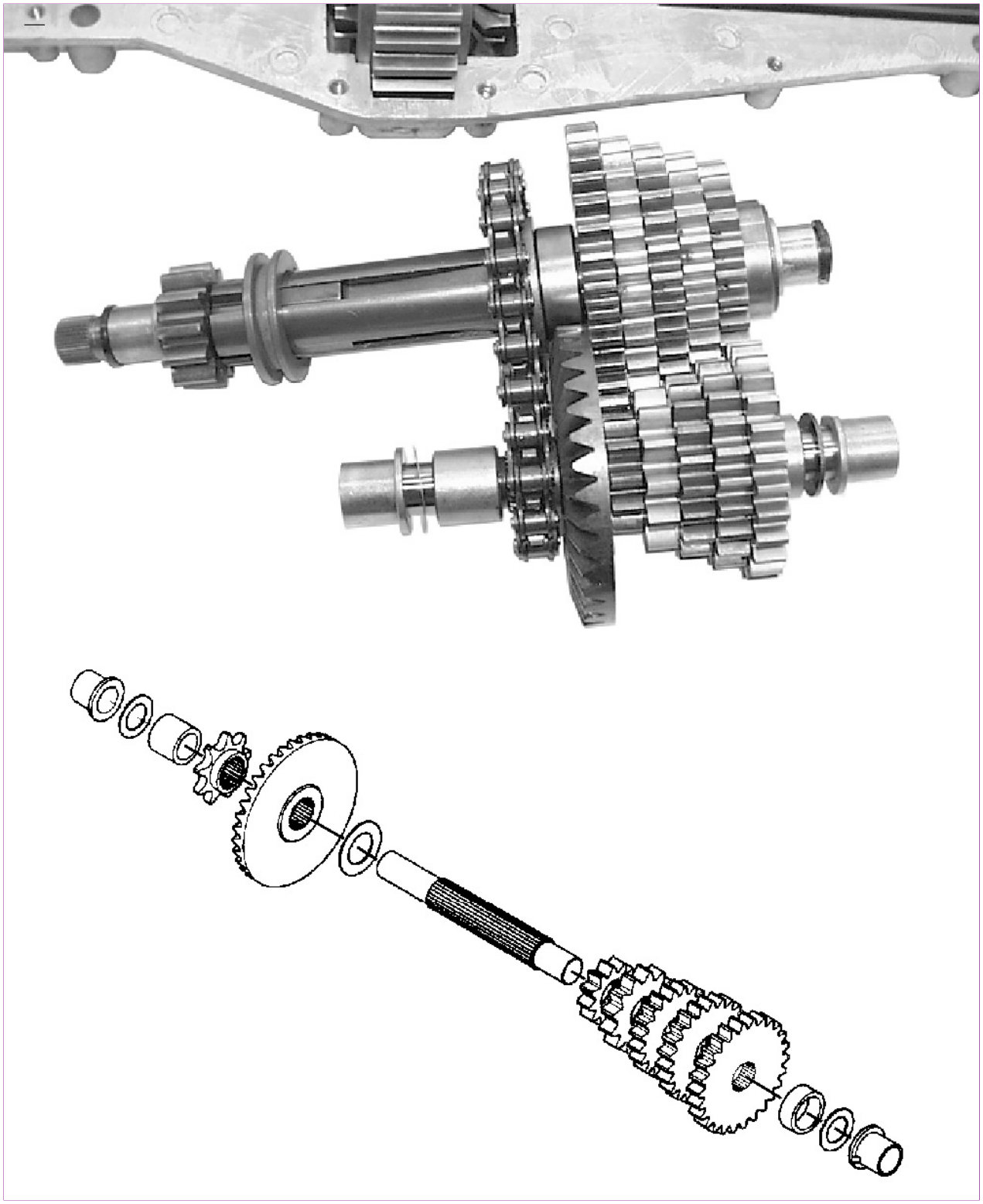
3. 

   Install remaining intermediate shaft components in their proper order and orientation.
4. Install chain (E) on sprocket.
5. Install new seals (F).
6. *NOTE:*

   Long flange of small sprocket faces bevel gear.

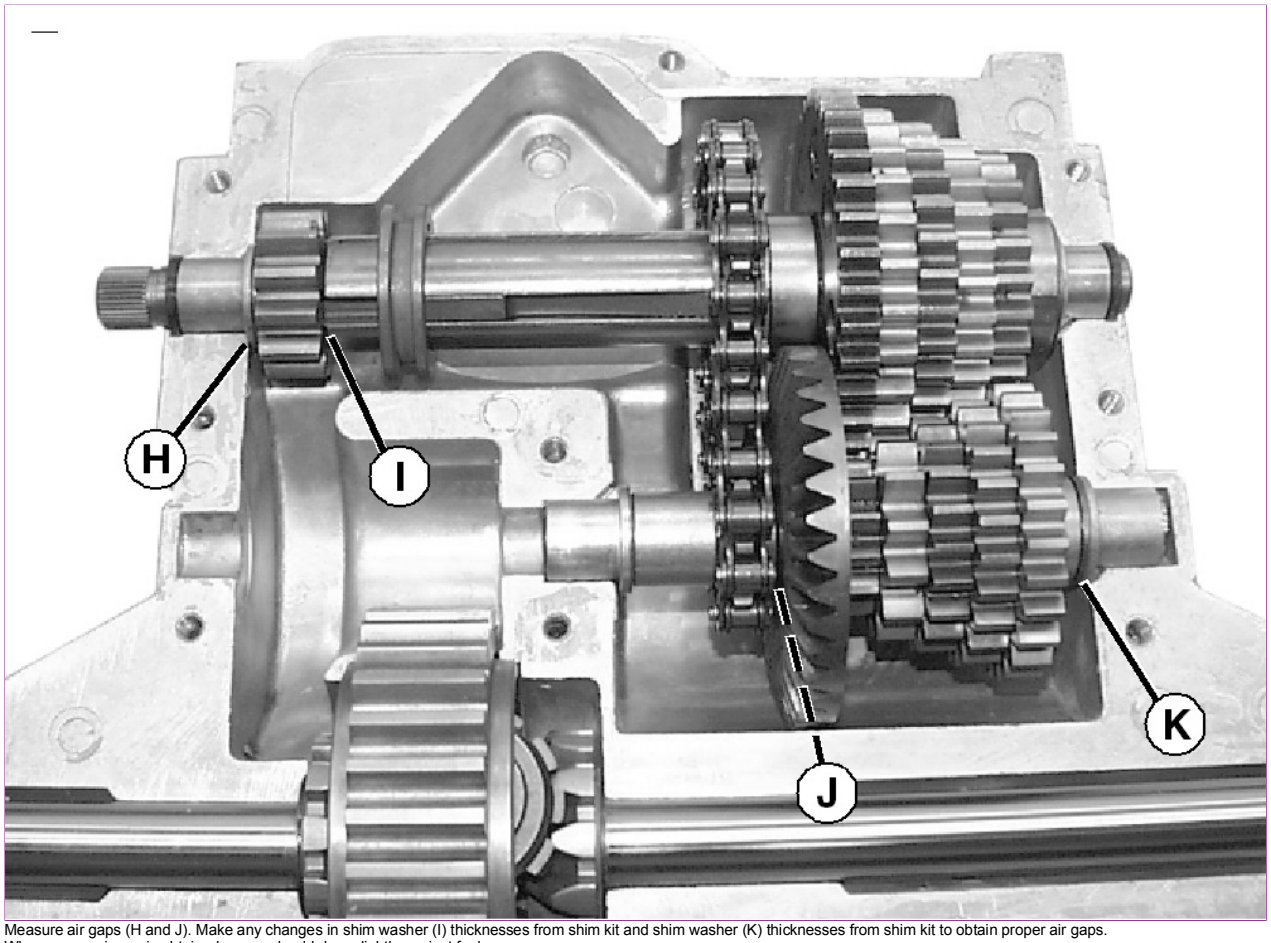


Install small sprocket gear (G) in chain. Hold bevel gear in place and slide drive shaft through them.



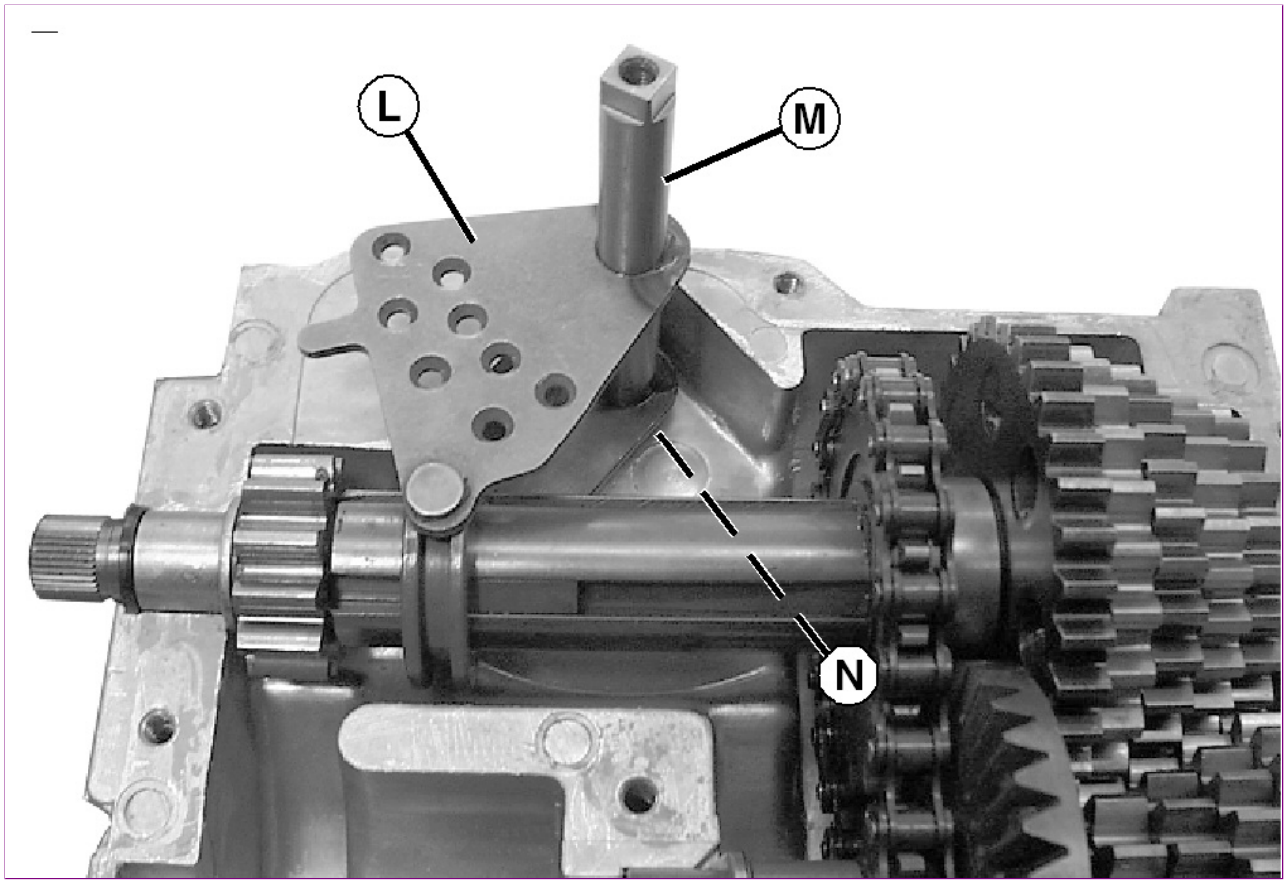
7. Install drive shaft components one at a time from left-to-right.
8. Shim washers for intermediate shaft are found in shim kit.
9. Shim washers for drive shaft are found in shim kit.
10. **IMPORTANT:**

    Seat bronze bushings with triangular tabs set into case recesses.



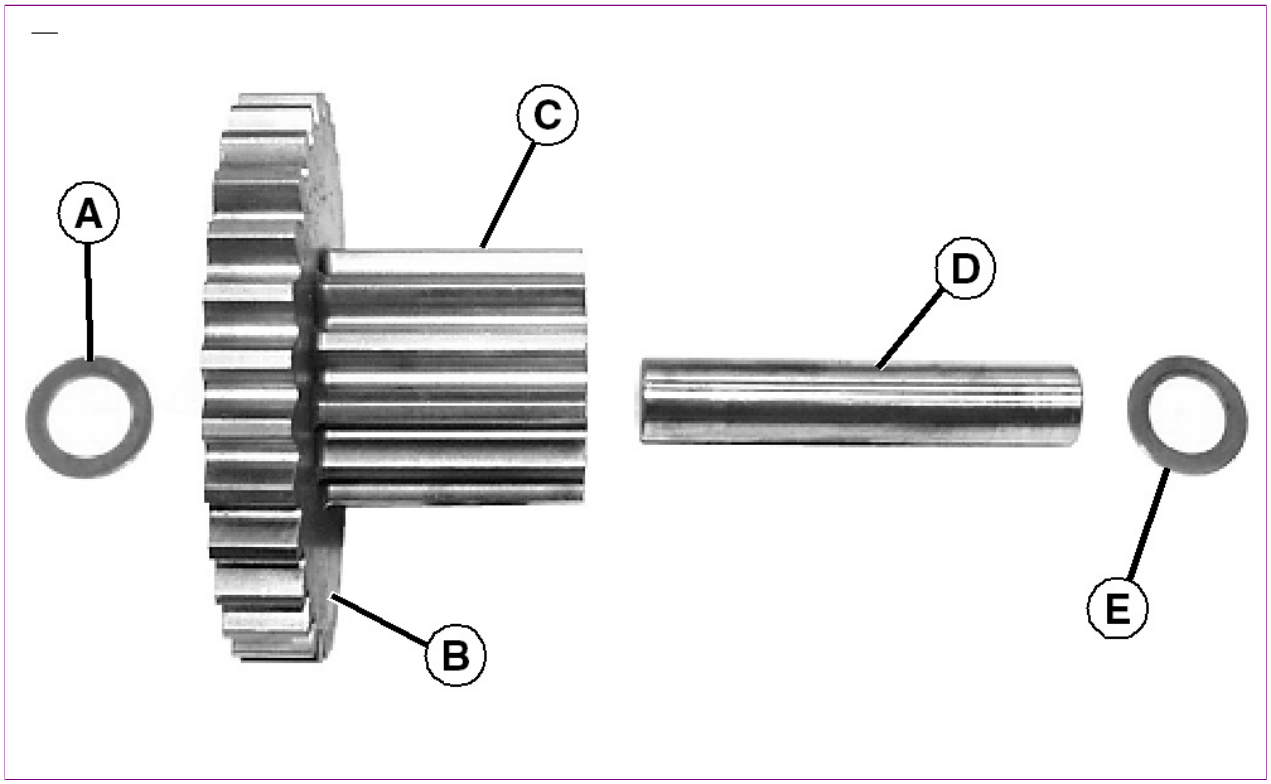
Measure air gaps (H and J). Make any changes in shim washer (I) thicknesses from shim kit and shim washer (K) thicknesses from shim kit to obtain proper air gaps.

11. When proper air gap is obtained, gears should drag slightly against feeler gauge.



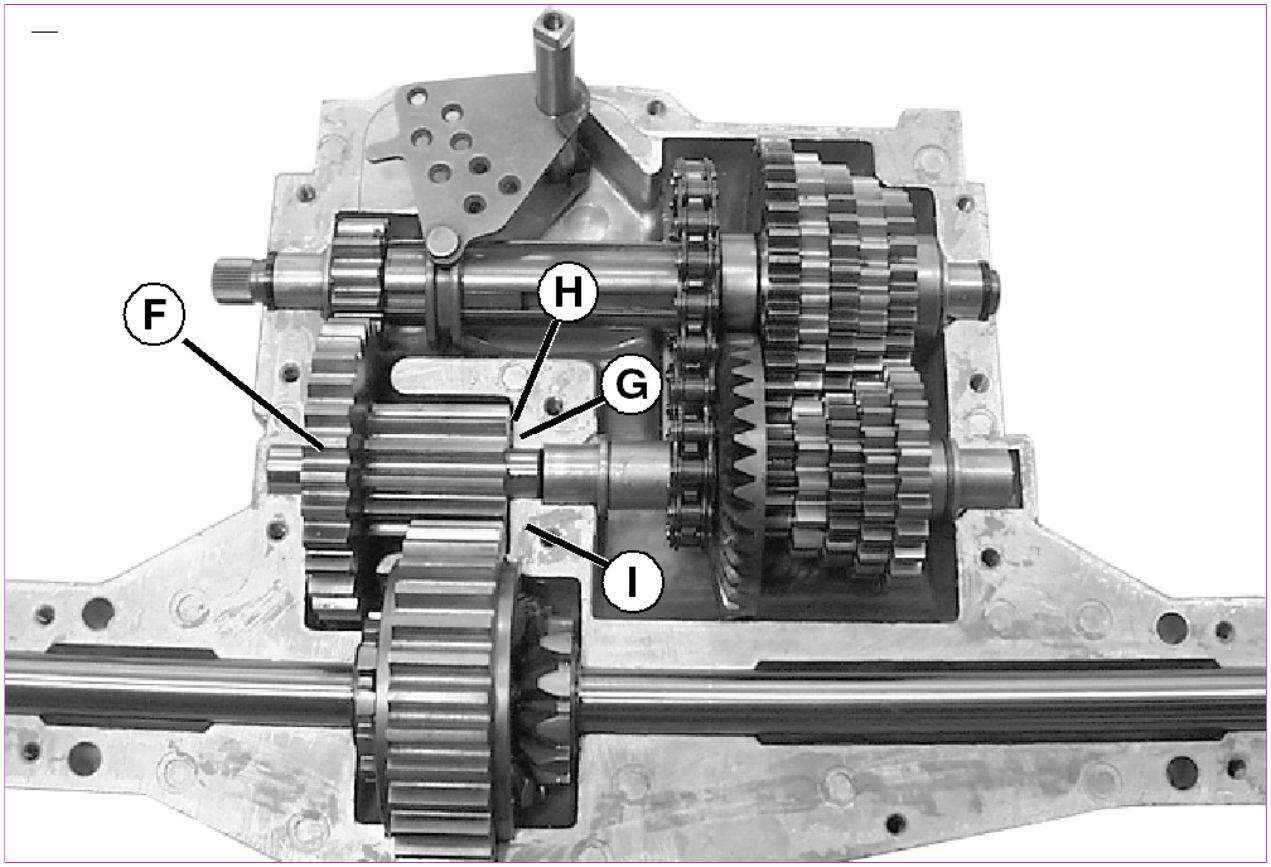
12. John Deere Never-Seez® MUST be applied to top surface (L) of shifter plate and contact portions of shifter shaft (M) and (N) with upper and lower case halves.
13. Install shifter fork assembly.

Assemble Idler Combination Gear Assembly:



1. Install components on idler shaft in order shown:
   - Washer (A) should be 0.632 x 1.00 x 0.046 in.

- Narrow combination gear (B) should have 30 good teeth and wide combination gear (C) should have 12 good teeth
- Idler shaft (D) should be smooth, not scored, worn, or pitted
- Shim washer (E) is found in shim kit

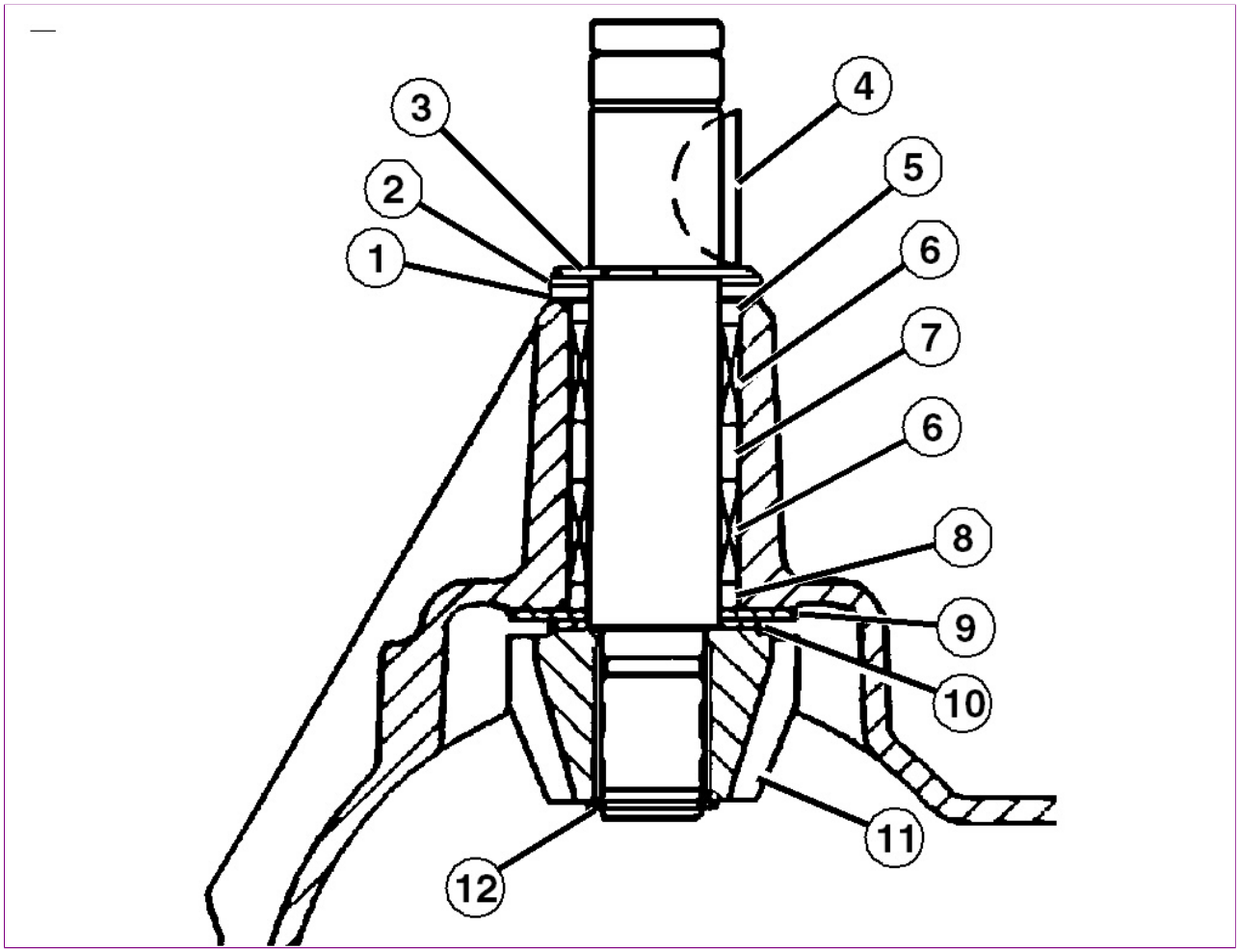


2. Install idler combination gear assembly (F) into lower case half.
3. Measure air gap (G) between shim washer (H) and face of case (I).
4. When proper air gap is obtained, assembly should drag slightly against feeler gauge.

Assemble Input Shaft/Pinion Gear Assembly:

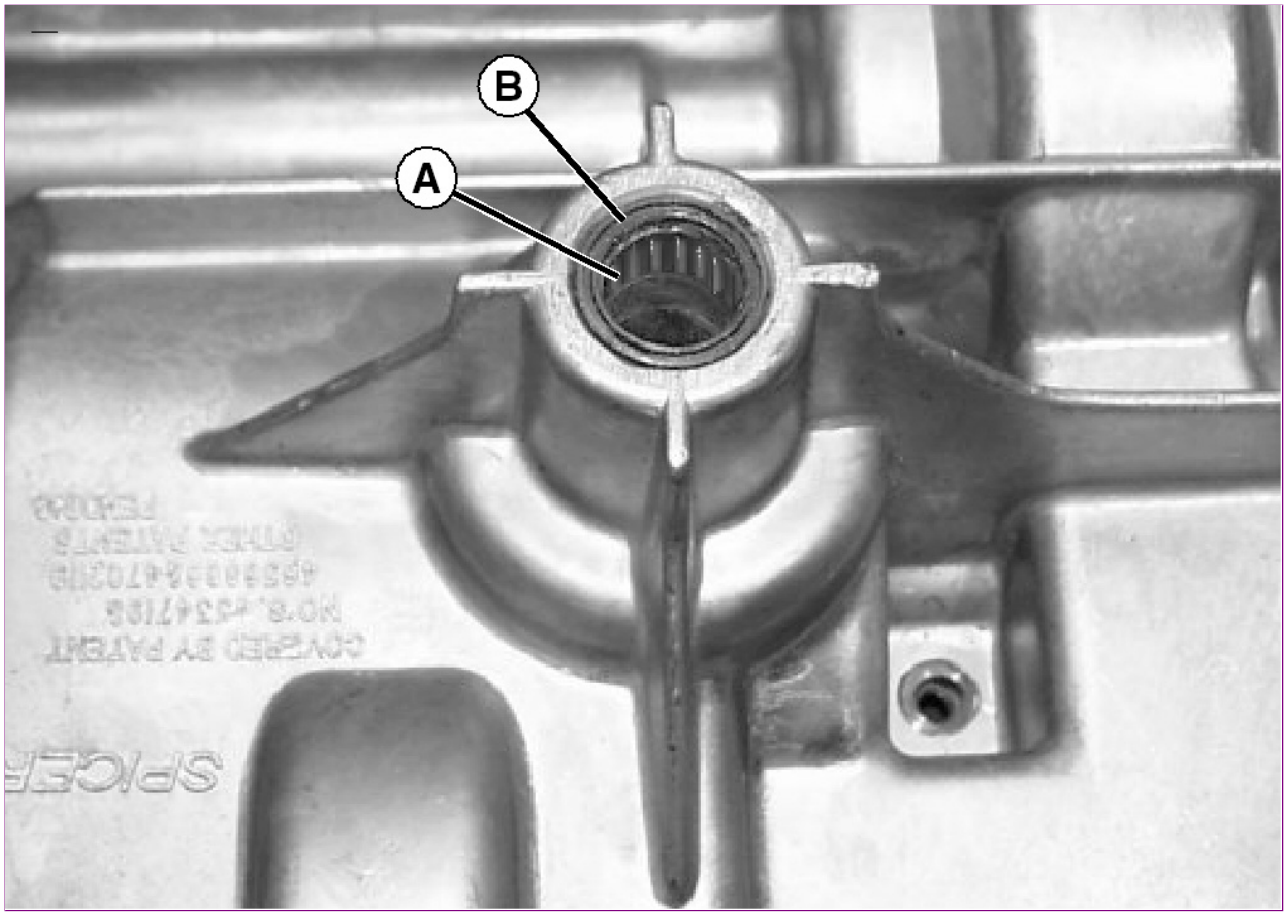
IMPORTANT:

DO NOT scratch or deform upper case half bore when installing needle bearings.

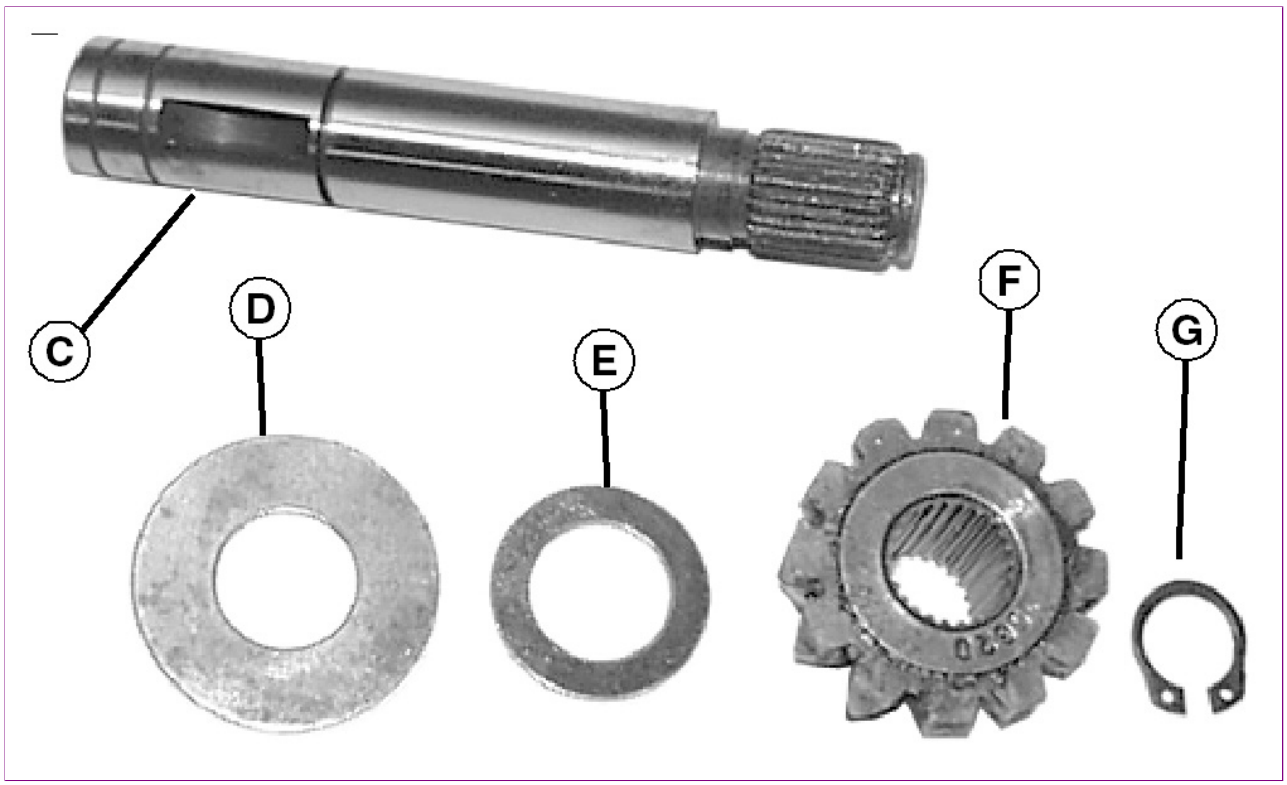


1. Washer
2. Shim
3. E-Ring
4. Key
5. Spacer
6. Needle Bearings
7. Cavity
8. Cavity
9. Large Washer
10. Small Washer
11. Bevel Pinion Gear
12. Snap Ring

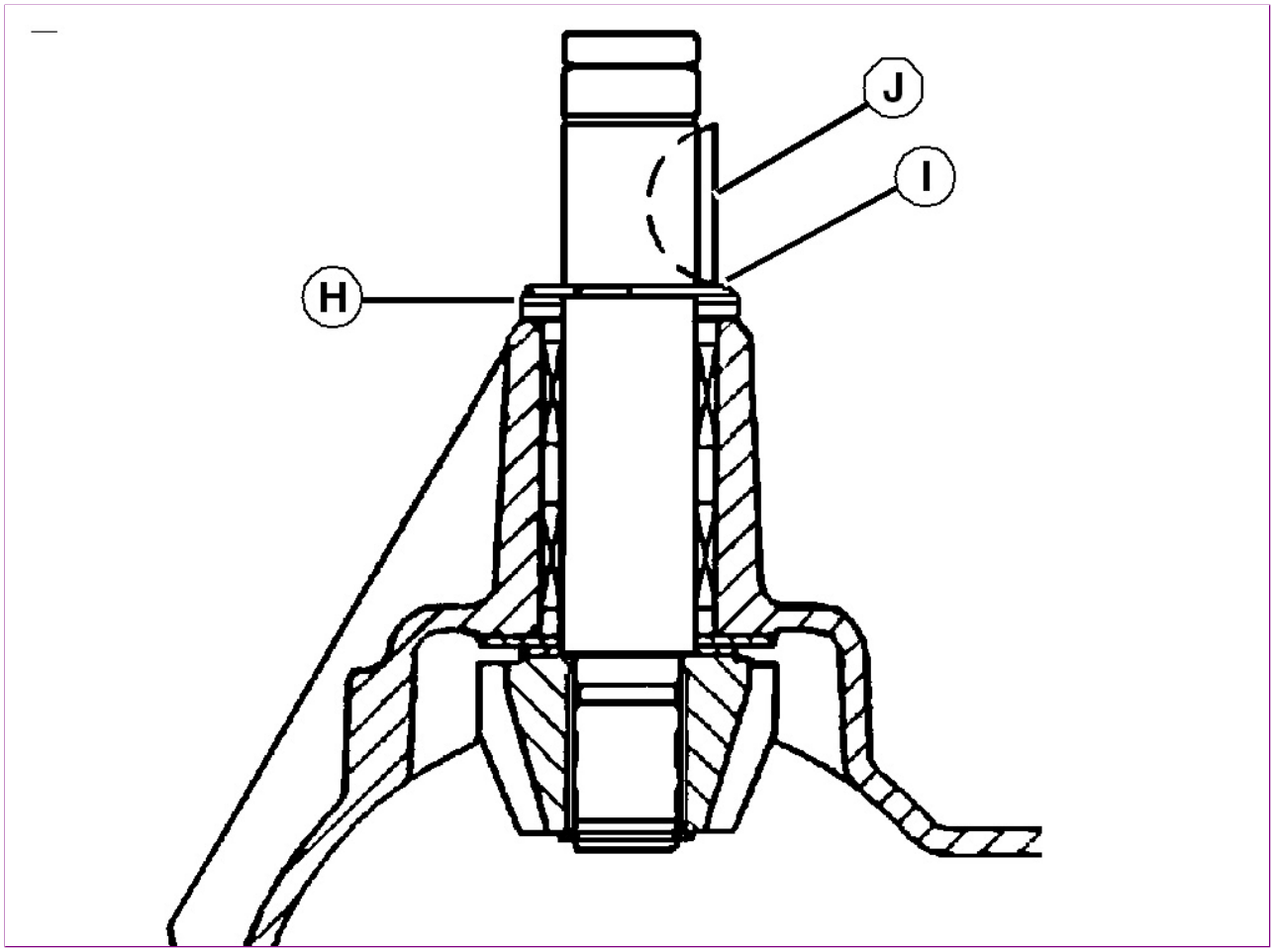
1. Needle bearings MUST be packed with grease before installing.
2. Install lower needle bearing with flat side of bearing (With Lettering) toward inside of case. Press lower needle bearing in case bore until it is recessed 3.3 mm (0.13 in.) from inside bore opening.



3. Install upper needle bearing (A) with flat side of bearing (With Lettering) toward outside of case. Press upper bearing in case bore until it is 0.76 mm recessed with outside bore opening.
4. Install spacer (B) until it is 0.03 mm recessed with outside bore opening.
5. Pack cavities with grease before installing input shaft.

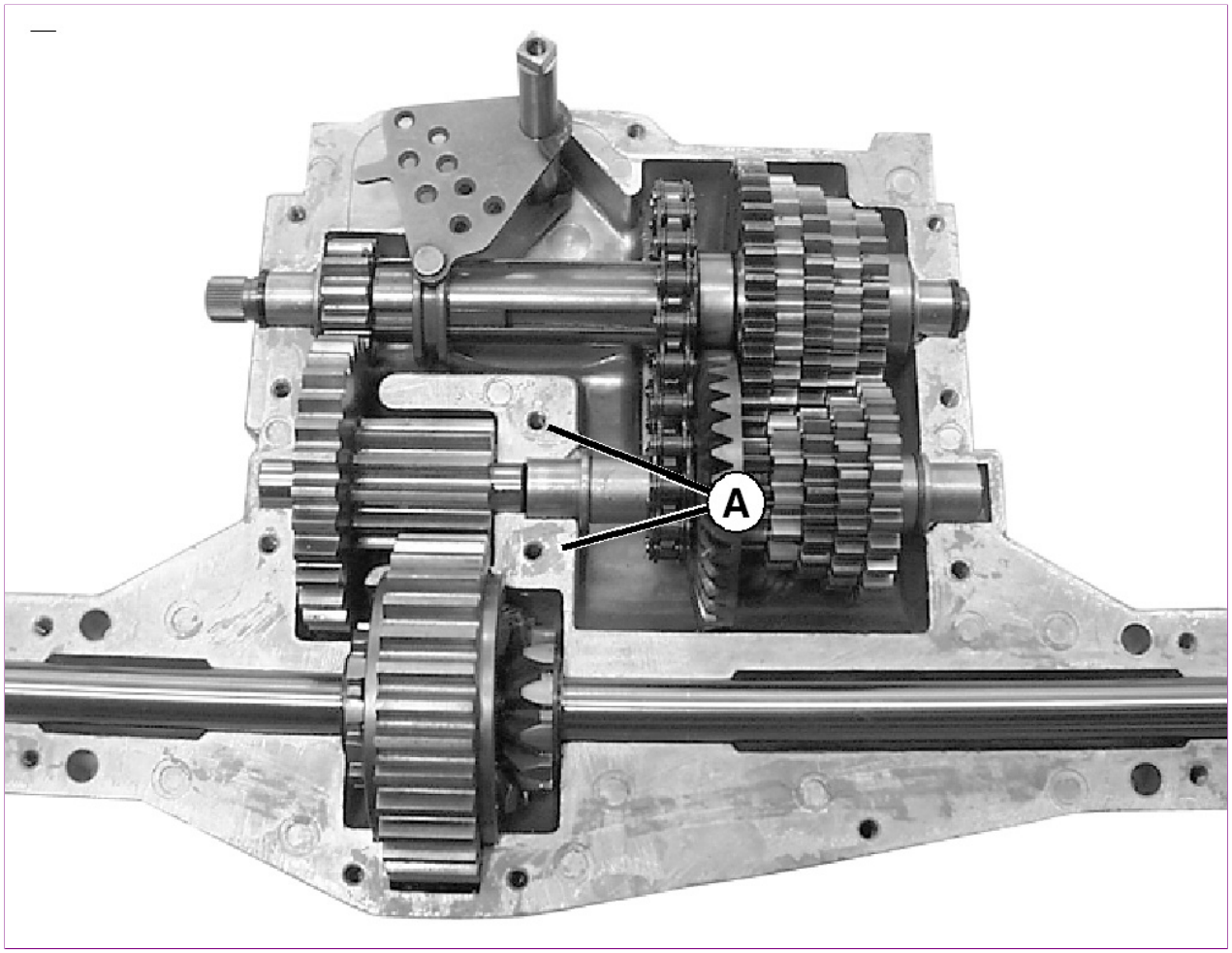


6. Install input shaft (C) (with keyway on outside of case), large washer (D), small washer (E), bevel pinion gear (F), and snap ring (G).
7. Turn upper case half over.



8. Install a shim washer (H) (From Shim Kit) of the proper thickness that allows enough clearance for E-ring (I) to be installed. Go air gap should be 0.25 mm (0.010 in.) or less.
9. Turn upper case half over and measure air gap between snap ring and bevel pinion gear.
10. If measurement results in a no-go reading, shim thickness needs to be changed.
11. Install woodruff key (J) in shaft keyway.

Assemble Transaxle Housing Case Halves:



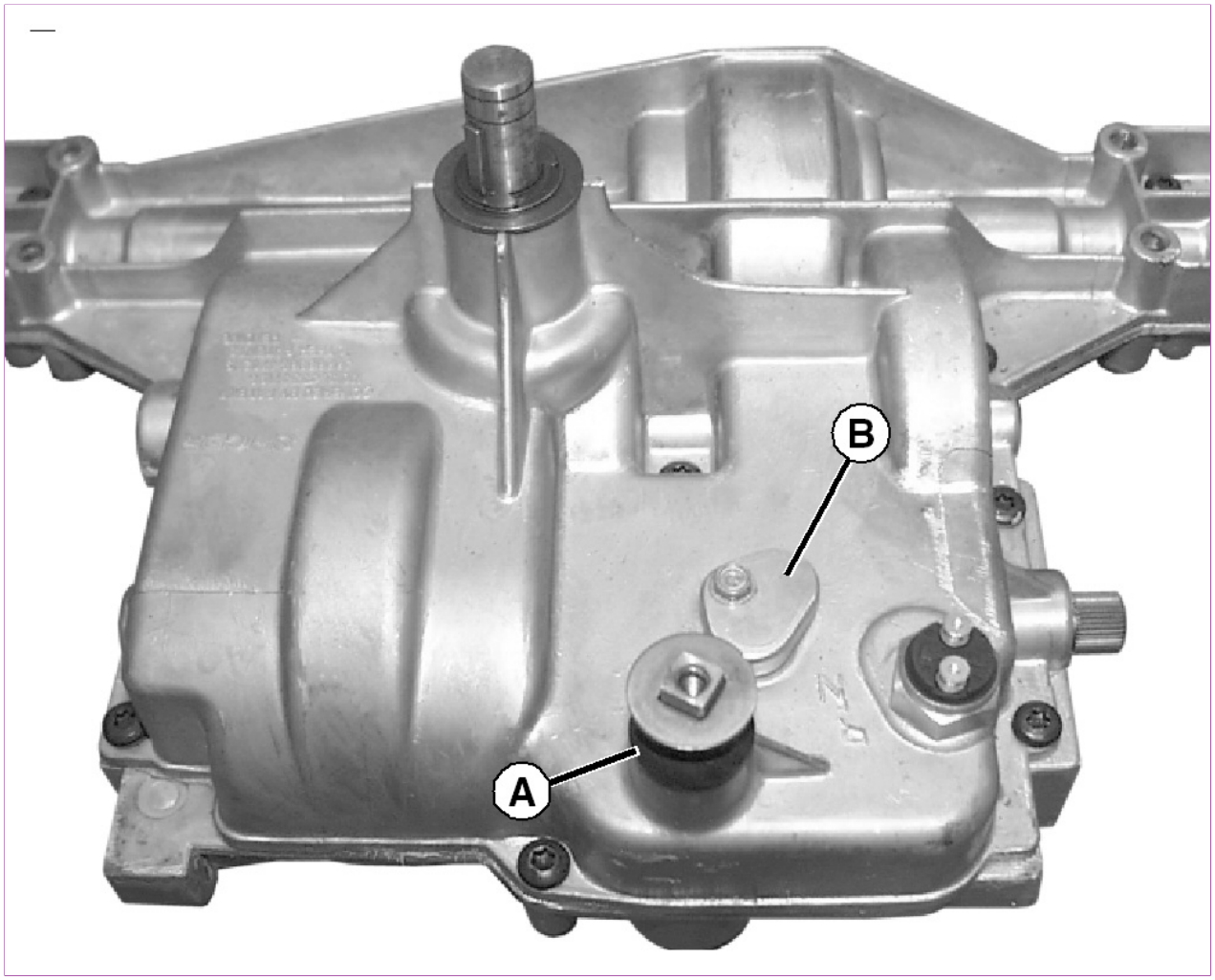
1. Pack upper case beveled pinion gear and lower case housing assembly with 638 g (1.406 lbs) of grease.
2. Apply John Deere Form-In-Place Gasket Silicone Sealant to lower case mating surfaces.
3. Apply silicone all around case cutouts where intermediate shaft flange bearing sets into upper and lower case halves (A).
4. *NOTE:*

   Be sure sealant does not contact any gear, shaft, or bearing surfaces.

   Align lower and upper case halves together, be sure intermediate/brake shaft seals and axle shaft seals are seated correctly. You may have to turn input shaft slightly to insure beveled pinon gear meshes with beveled drive gear.
5. Install socket head screws and tighten to specification.

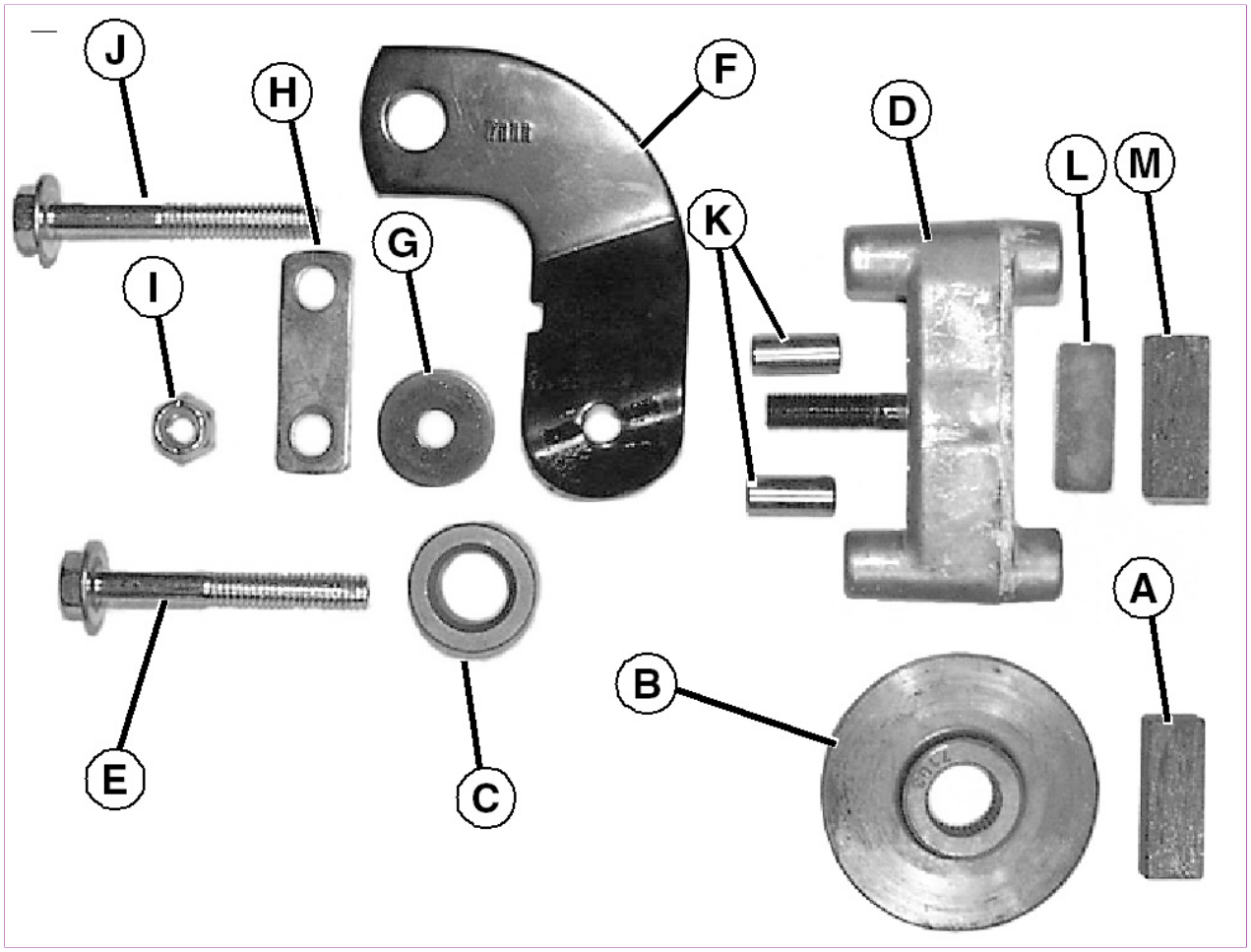
Item	Measurement	Specification
Specifications:		
Transaxle Cap Screw Torque		9.5 N•m 85 lb-in.)

Install Shifter Detent Assembly:



1. Install shifter shaft rubber boot (A). Install square hole washer.
2. Coat detent balls and springs with John Deere Never-Seez and install in case bores.
3. Apply sealant to inside of detent cover (B).
4. Install and tighten detent cover and screw until flush with top of mounting hole surface.

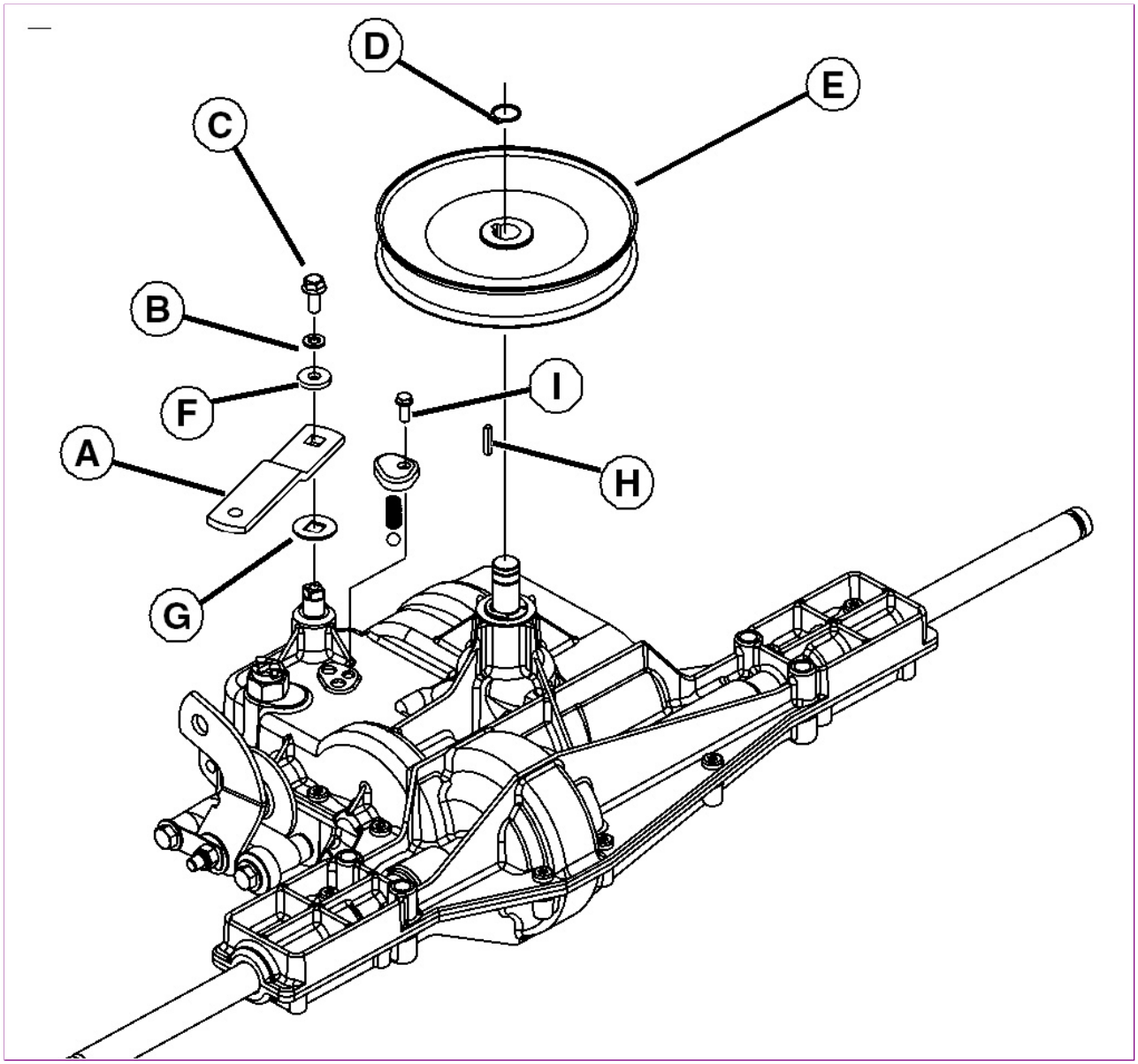
Install Brake Assembly:



1. Install thinner friction puck (A) in lower case puck recess.
2. Install brake disc (B) with hub outward.
3. Install spacer (C) over right lip of mounting bracket (D).
4. Install cap screw (E) in right mounting bracket hole.
5. Install brake lever (F), washer (G), bracket (H), and lock nut (I) on mounting bracket center stud.
6. Install cap screw (J) in left hole of mounting bracket (D).
7. Coat dowel pins (K) with John Deere Never-Seez®. Install dowel pins inside two center holes of mounting bracket (D).
8. Install striker plate (L) and thick friction puck (L) in backside recess of mounting bracket.
9. Install complete brake assembly to transaxle.
    - Tighten mounting cap screws to specification.
    - Tighten lock nut (I) **until there is a 0.254 mm (0.010 in.) air gap** between thick friction puck and brake disc.
    - Check that brake is not dragging. See Brake Section for adjustment procedure.

Item	Measurement	Specification
Specification:		
Brake Assembly Cap Screws		20 N•m 180 lb-in.)

Drive Sheave and Shift Arm Installation:



1. Install woodruff key (H) in input shaft.
2. Install drive sheave (E). Fasten with snap ring (D).
3. Install square hole washer (G) and shift arm (A). Be sure when installing, that special square hole washer and shift arm are seated properly over square end of shifter shaft.
4. Install washer (F), lock washer (B) and cap screw (C). Tighten cap screw (C) to specification.

Item	Measurement	Specification
Specification:		
Shift Arm Cap Screw		16 N•m 140 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Specifications

Specifications

NOTE:

The T40 and K46 transaxles have no internal serviceable components. Be certain that all diagnostic procedures are performed and that the oil level is correct before replacing the transaxles.

Item	Measurement	Specification
Transaxle:		
Type (LA115/LA125/LA135/LA145)		Tuff Torq® T40J Transaxle
Type (LA155/LA165/LA175)		Tuff Torq® K46AC Transaxle
Travel Speed-Forward (LA115/LA125/LA135/LA145/LA155/LA165/LA175)		0 - 8.9 km/h 0 - 5.5 mph)
Travel Speed-Reverse (LA115/LA125/LA135/LA145/LA155/LA165/LA175)		0 - 5.1 km/h 0 - 3.2 mph)

Item	Measurement	Specification
Brake		
Brake Type		Wet Disk
Brake Capacity		351.5 N•m 259 lb-ft) with 11.3 N•m 100 lb-in.) on brake arm
Brake Lever Travel (Maximum)		30

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Adjustment Specifications

Adjustment Specifications

Item	Measurement	Specification
Specifications:		
Forward Pedal-to-Frame Height		76 - 80 mm 3.00 - 3.15 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Torque Specifications

Torque Specifications

Item	Measurement	Specification
Specifications:		
Drain Bolt		14.7 N•m 130 lb-in.)
Center Case Cap Screw		43 N•m 32 lb-ft)
Case Half Cap Screw (Same Case)		24 N•m 205 lb-in.)
Case Half Cap Screw (New Case)		29 N•m 252 lb-in.)
Flat Idler Nut On Idler Arm Assembly		26 N•m 19 lb-ft)
Transaxle-to-Frame Mounting Cap Screws and Nuts		40 N•m 30 lb-ft)
Reverse Pedal Set Screw		2.3 N•m 20 lb-in.)
Transaxle Fan Nut		30 N•m 22 lb-ft)
Rear Wheel Bolts		55 N•m 41 lb-ft)
Rear Tie Rod End Lock Nut		60 N•m 44 lb-ft)
Eccentric Nut		24.5 - 32 N•m 18 - 24 lb-ft)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Other Materials

Other Materials

Number	Name	Use
PM37397 LOCTITE 592 (U.S.)	Pipe Sealant with TEFLON,	Seal pipe plug
PM38655LOCTITE 515 Canada PM38625 (U.S.)	Flexible Sealant	Seal transaxle case mating surfaces

LOCTITE is a registered trademark of the Loctite Corp.

TEFLON is a registered trademark of the DuPont Co.

IMPORTANT:

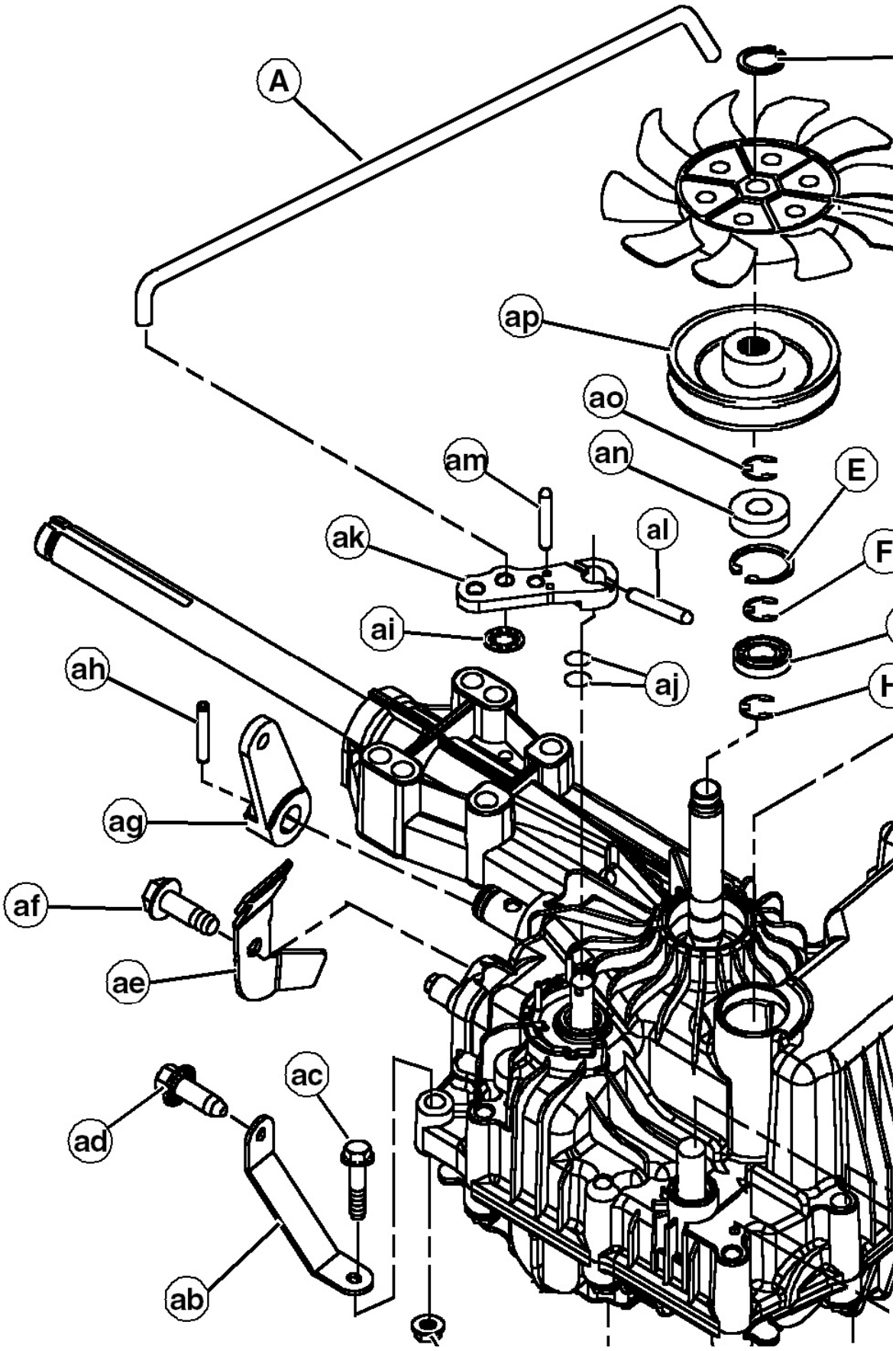
Use ONLY the following oils for service. DO NOT use automatic transmission fluid.

NOTE:

The transmissions are filled with 10W30 engine oil at the factory.

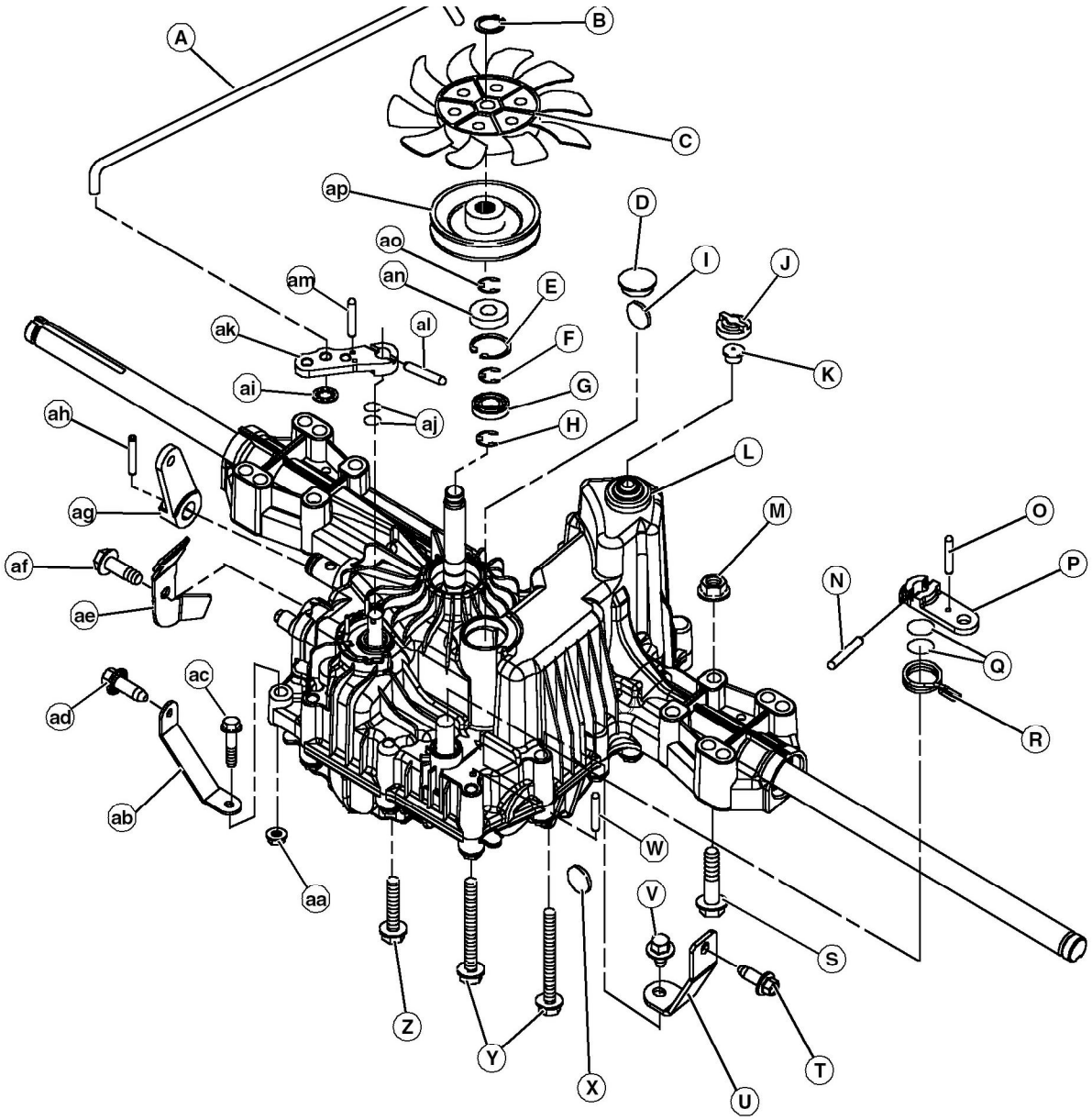
For the transmissions used in extreme or high-hour applications, J20C Hygard Hydraulic oil or 5W-50 Synthetic Engine Oil is approved as an optional fill. Use only after a complete drain of the factory oil.

Transaxle Components

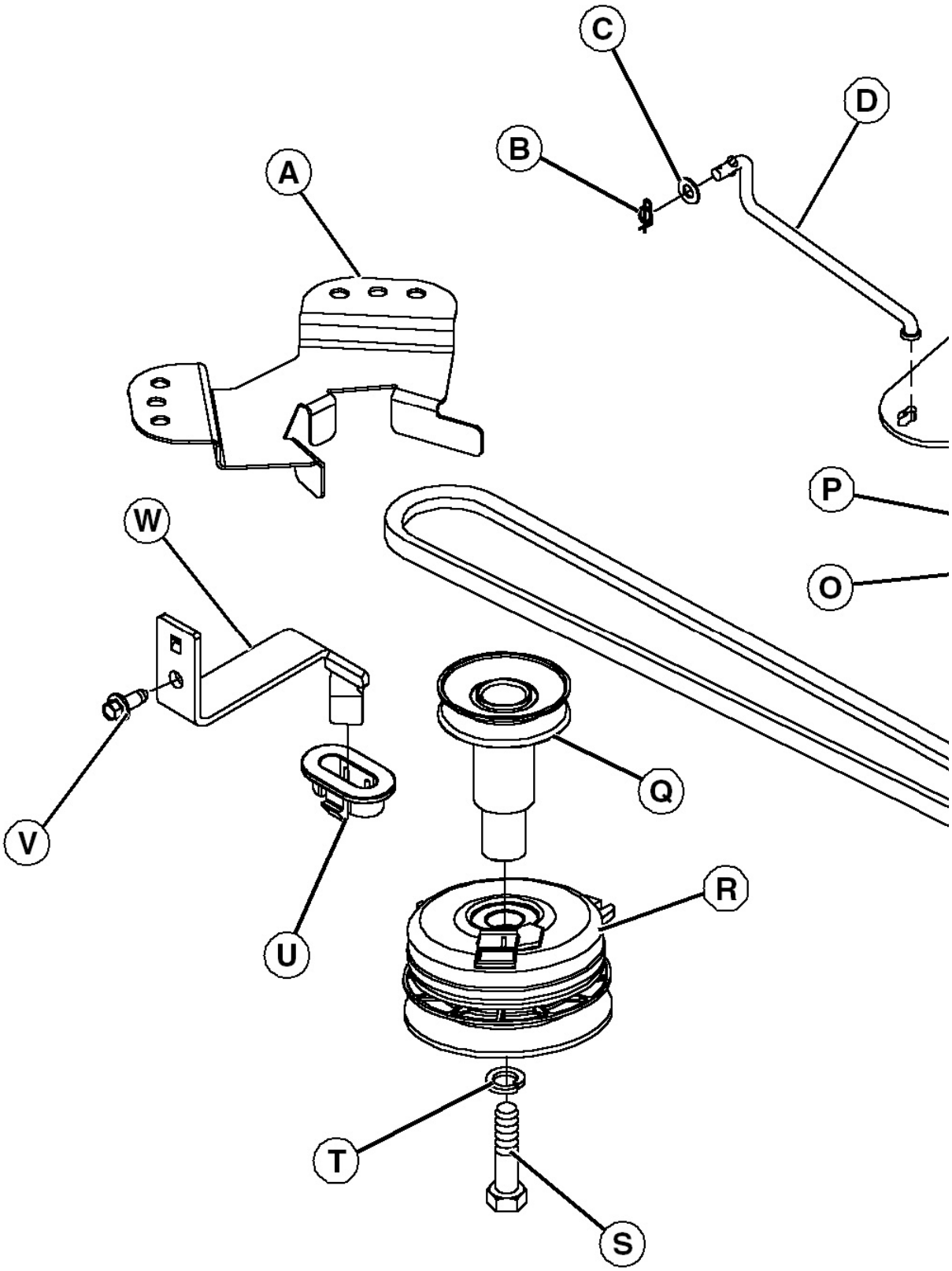

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LEGEND:

A - Tow Valve Rod
B - Snap Ring
C - Fan
D - Plug
E - Snap Ring
F - Snap Ring
G - Bearing
H - Snap Ring
I - Magnet
J - Cap
K - Valve
L - Transaxle Housing
M - Lock Nut
N - Spring Pin
O - Spring Pin
P - Brake Arm
Q - O-Rings
R - Return Spring
S - Screw
T - Screw
U - Left Torque Strap Bracket
V - Screw
W - Spring Pin
X - Magnet
Y - Screw
Z - Bolt (14 used)
AA - LockNut
AB - Right Torque Strap Bracket
AC - Screw
AD - Screw
AE - Reverse Switch Bracket
AF - Screw
AG - Control Lever
AH - Spring Pin
AI - Push Nut
AJ - O-Rings
AK - Bypass Lever
AL - Spring Pin
AM - Spring Pin
AN - Seal
AO - Snap Ring
AP - Pulley


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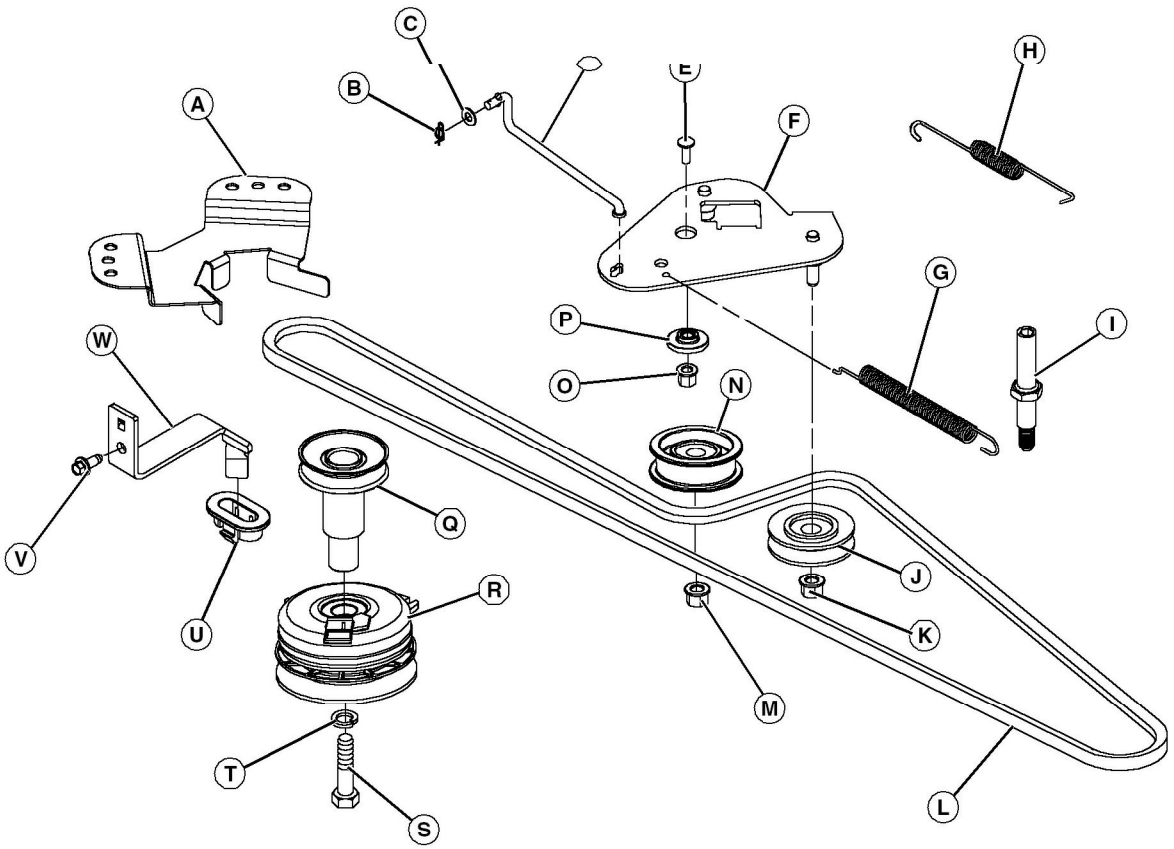
Drive Components - LA115, 125, 135, 145, and 155



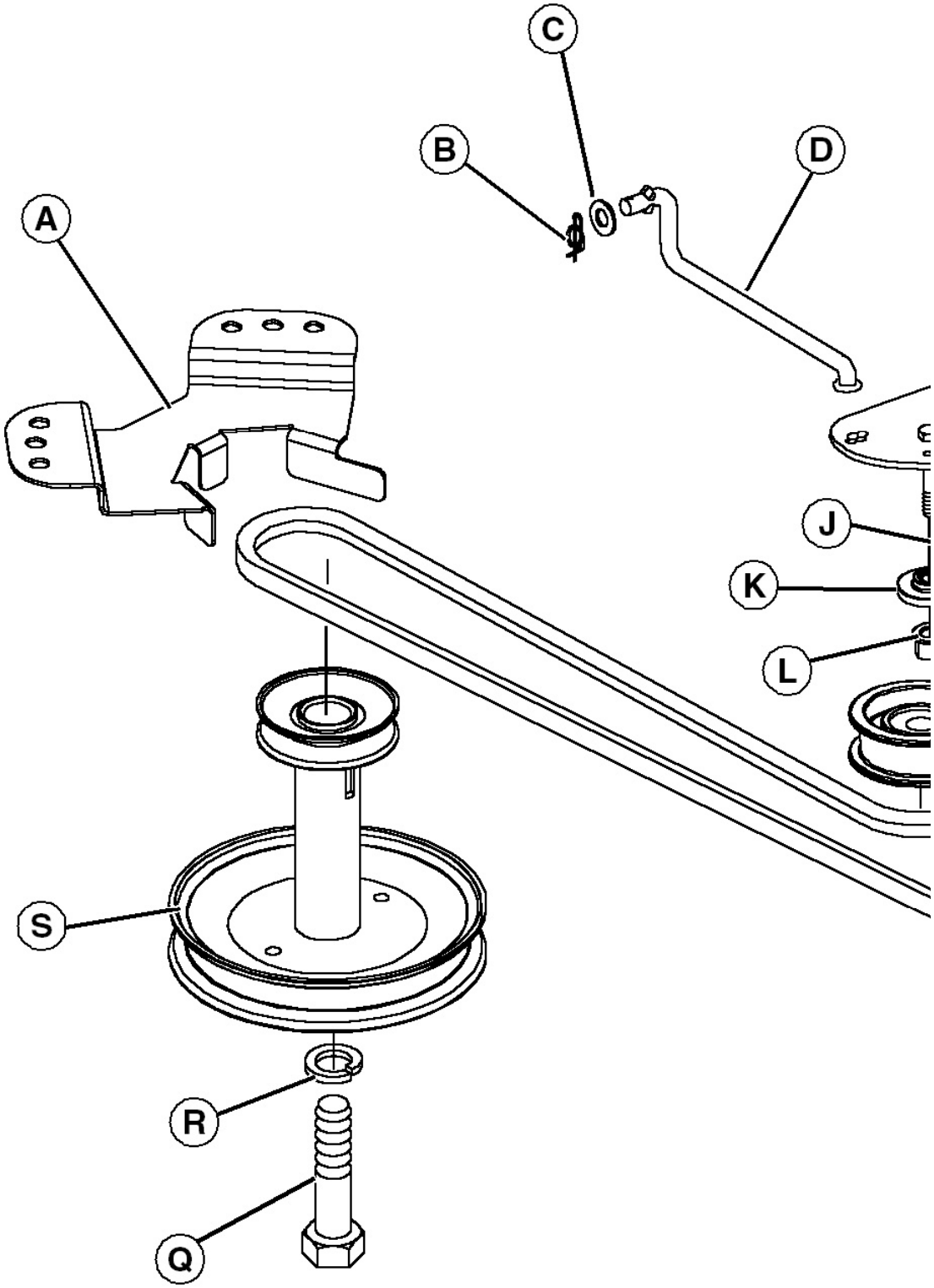
LEGEND:

A - Belt GuideBelt guide removed at serial number 200000. Machines above serial number 200000 have built guide built into the engine mounting plate.
B - Cotter Pin
C - Washer

D - PTO Clutch Rod
E - Bolt
F - Idler Arm
G - Extension SpringSpring use SN -200000
H - Extension SpringSpring use SN 200001-
I - Guide
J - V-Idler
K - Lock Nut
L - Traction Drive Belt
M - Lock Nut
N - Flat Idler
O - Lock Nut
P - Bushing
Q - Sheave
R - Clutch
S - Cap Screw
T - Lock Washer
U - Grommet
V - Screw
W - Anti-Rotation Bracket


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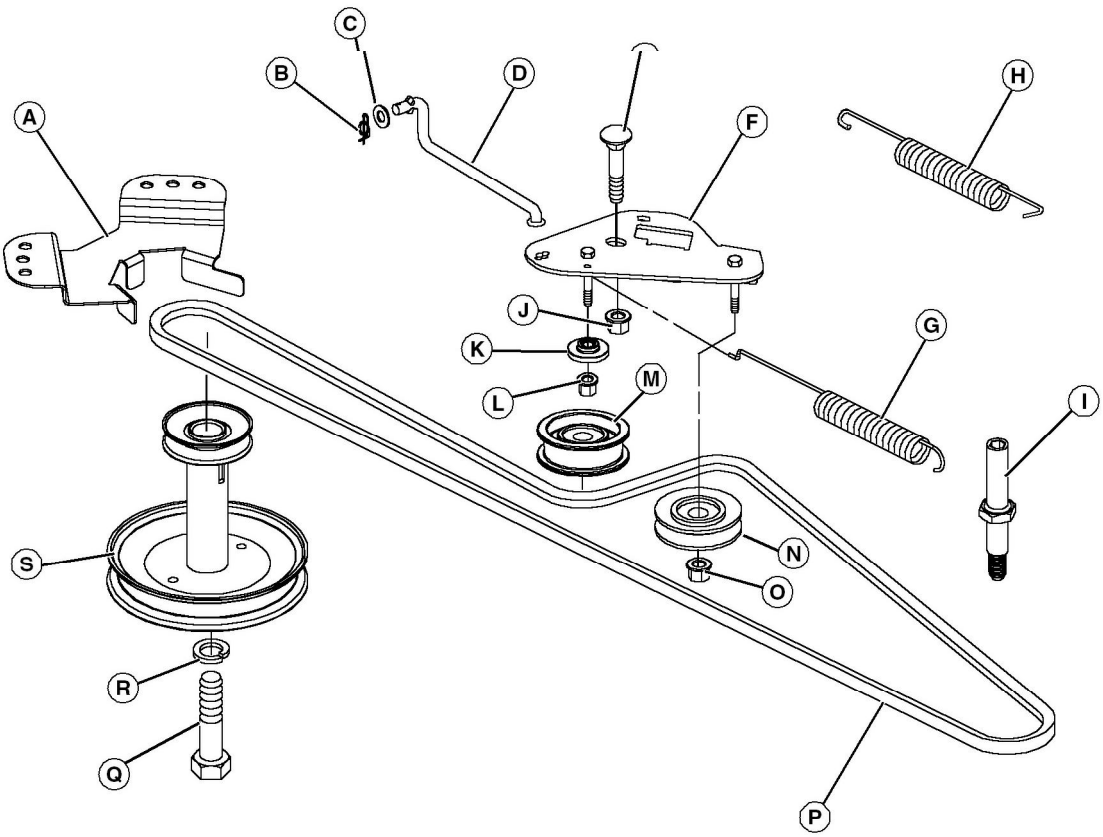
Drive Components - LA165 and 175



LEGEND:

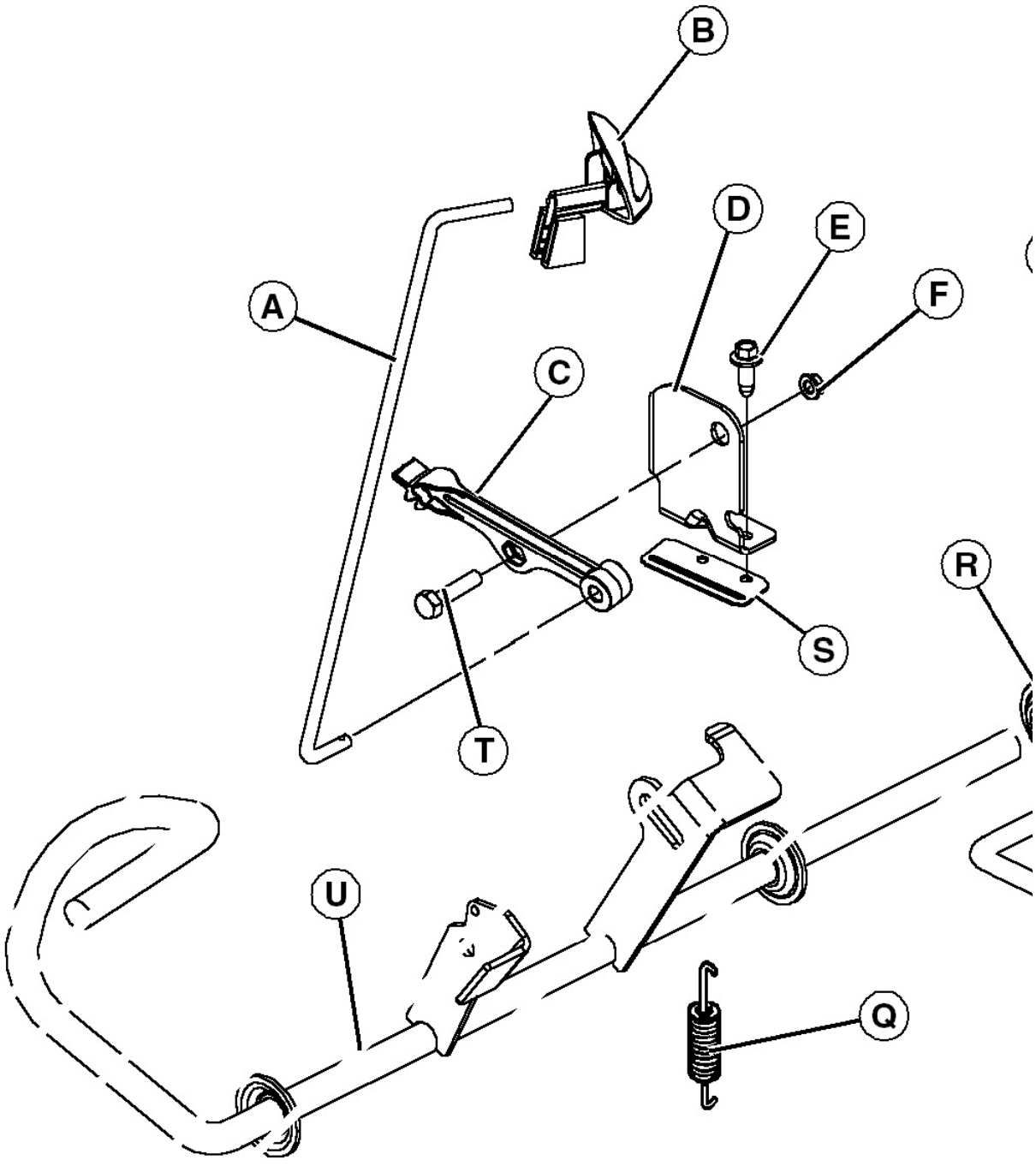
A - Belt GuideBelt guide removed at serial number 200000. Machines above serial number 200000 have built guide built into the engine mounting plate.
B - Cotter Pin
C - Washer
D - PTO Clutch Rod
E - Bolt

F - Idler Arm
G - Extension SpringSpring use SN -200000
H - Extension SpringSpring use SN 200001-
I - Guide
J - Lock Nut
K - Bushing
L - Lock Nut
M - Flat Idler
N - V-Idler
O - Lock Nut
P - Traction Drive Belt
Q - Cap Screw
R - Lock Washer
S - Sheave


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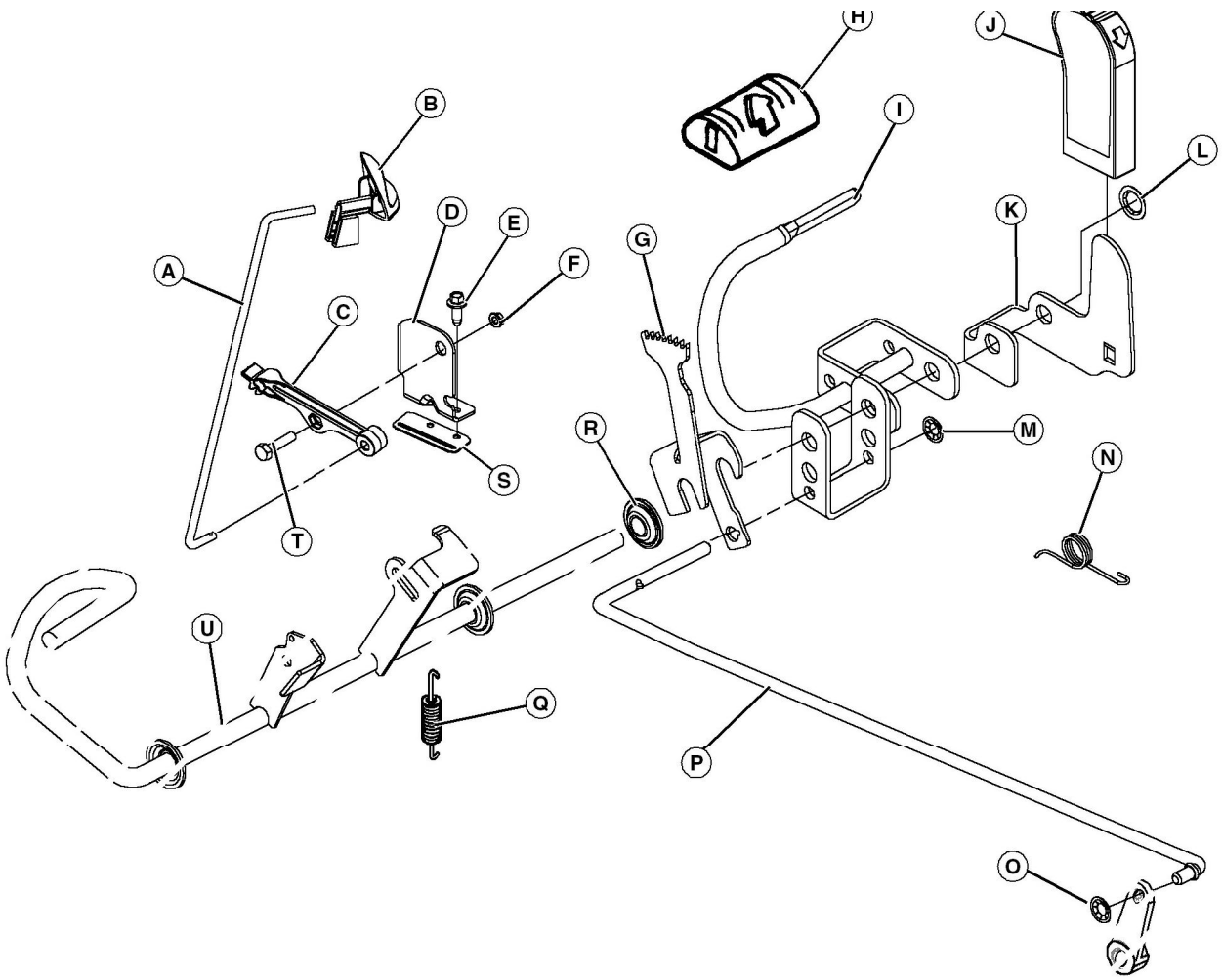
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Forward/Reverse Pedals and Linkage

Forward/Reverse Pedals and Linkage


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LEGEND:

A - Cruise Control Rod
B - Cruise Control Handle
C - Cruise Latch
D - Cruise Pivot Bracket
E - Screw
F - Lock Nut
G - Cruise Tooth Bracket
H - Forward Pad
I - Forward Pedal Bracket
J - Reverse Pad
K - Reverse Pedal Bracket
L - Push Nut
M - Push Nut
N - Torsion Spring
O - Push Nut
P - Forward/Reverse Motion Control Rod
Q - Extension Spring
R - Spacer
S - Plate
T - Cap Screw
U - Brake Pedal Shaft


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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Traction Drive Belt System

Traction Drive Belt System

Function:

The traction drive belt transfers power from the engine to the input sheave of the hydrostatic transaxle.

Theory of Operation:

The traction drive belt is driven by the upper pulley of the engine drive sheave. The traction belt transmits engine power to the input sheave of the hydrostatic transaxle.

The traction drive belt is tensioned by two idler sheaves, which are mounted on a spring loaded bracket. The tension spring runs from the idler arm to the deck lift rod that mounts across the top of the frame rails.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Transaxle

Transaxle

Function:

The function of the transaxle is to transfer power from the traction drive belt system (driven by the engine), to the rear wheels, and allow the operator to select ground speed and direction.

Theory of Operation:

The drive belt turns the transaxle input pulley, and transaxle input shaft. This, in turn drives the transaxle hydrostatic pump. When the hydrostatic drive is in neutral, the pump pistons do not move up and down in their bores, therefore, no pressure is built up in the pump. When the operator engages the forward or reverse pedals, the pedal linkage tilts a swash plate inside the transaxle. This causes the pump pistons to travel up and down in their bores. The pump pistons create hydraulic pressure which drives the hydrostatic motor. The motor drives the rear axle and wheels through a reduction gear and differential assembly.

The transaxle provides infinite ground speed selections in forward and reverse.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Forward and Reverse Pedals

Forward and Reverse Pedals

Neutral:

When the engine is running, the traction drive belt turns the transaxle input pulley, cooling fan, and input shaft. The input shaft turns the hydrostatic pump input shaft and pump body inside the transaxle. When the forward/reverse pedals are not depressed, the control lever on the transaxle holds the control linkage in the NEUTRAL (centered) position, and the drive axles do not turn.

Forward:

When the forward pedal is depressed, the bottom of the forward pedal bracket is rotated rearward, pushing the forward/reverse control rod rearward. This pushes the control lever on the transaxle rearward, turning the control shaft inside the transaxle, and causing the drive axles to turn in the FORWARD direction.

Reverse:

When the reverse pedal is depressed, the reverse pedal bracket (seated in the forward pedal bracket) rotates the bottom of the forward pedal bracket forward and moves the forward/reverse control rod forward. This pulls the control lever on the transaxle forward, turning the control shaft inside the transaxle, and causing the drive axles to turn in the REVERSE direction.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Freewheel System

Freewheel System

IMPORTANT:

To prevent damage to hydrostatic transmission, do not operate freewheel valve with engine running.

Function:

The freewheel system allows the operator to push the machine forward or reverse with the engine off and the brake released.

Theory of Operation:

When the freewheel rod is pulled rearward, the freewheel rod rotates the freewheeling lever. This allows the operator to push the machine in forward or reverse with the engine off and the brake released.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake System

Brake System

Function:

The brake system provides the operator with a method to mechanically stop the movement of the machine. The brake system also provides a parking brake function through the use of a mechanical locking mechanism which, when engaged, holds the brake pedal in the depressed position.

Theory of Operation:

When the brake pedal is depressed, the compression spring in the brake assembly is compressed, and the idler arm assembly is rotated, removing tension from the traction drive belt. The brake assembly pulls on a lever on the transaxle. The transaxle brake lever actuates a wet disk brake inside the transaxle which is attached to the hydrostatic motor, which is linked to the axle shafts through a reduction gear and differential assembly.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Cruise Control

Cruise Control

Operation:

Use cruise control to maintain travel speed without having to hold the forward travel pedal down.

NOTE:

Cruise control operates only for forward travel.

Cruise control may be set by lifting the cruise control lever up as the forward pedal is depressed until the desired ground speed of the machine is set.

Depressing either the brake or reverse pedal will return the cruise control lever to the OFF position.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Internal Dampening System (IDS)

Internal Dampening System (IDS)

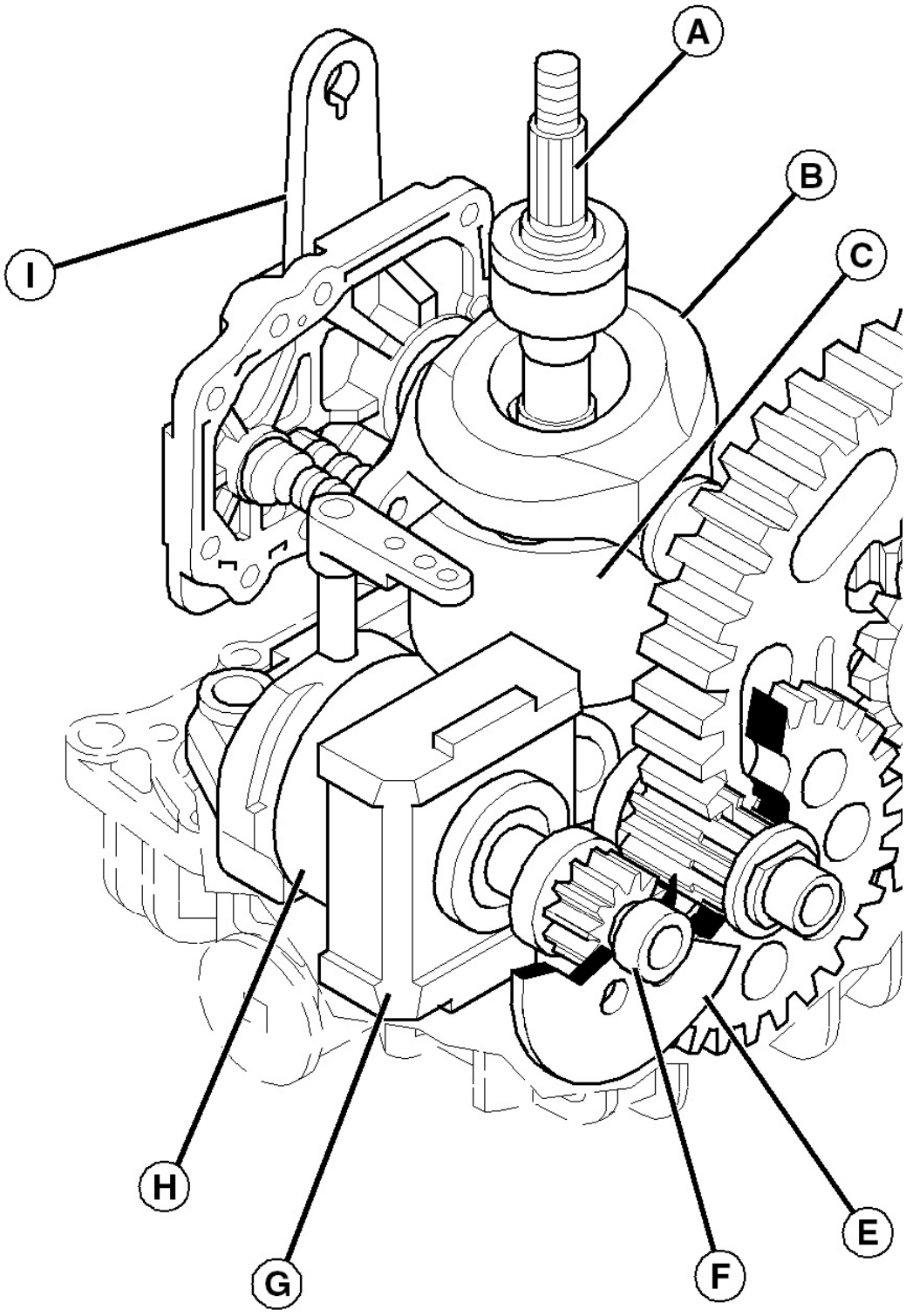
The transmissions use an internal dampening system (IDS) rather than an external hydraulic to provide smooth forward and reverse operation and speed change.

The IDS consists of small orifices in the hydro oil path that bleed-off pressure to smooth directional changes. These orifices affect operation in these ways:

- The orifices are only “open” when in neutral or during the first few degrees of forward or reverse swashplate movement. At higher angles of swashplate movement (when the pedals are pushed farther) the orifices close.
- The IDS ports affect power in reverse more than forward because the tractor’s reverse linkage travel is limited and less oil is pumped. With less oil flow, there is less oil available to overcome any oil loss being bypassed through the reverse IDS orifice. Perceived sluggish performance may result.
- Transaxle oil temperature has a larger affect overall transmission power. Warm or hot oil will pass through the IDS and orifices more easily than cold, thicker oil. Given the shorter swashplate throw allowed in reverse oil flow will bypass through the reverse orifice. Perceived sluggish performance may result.
- The IDS ports allow oil to bypass the hydro pump if the tractor is being pushed manually. The result is that the tractors can be pushed backwards without engaging the freewheel valve.
- The bleed-off oil allows for a wider range of neutral adjustment and prevents hydro creep should the hydro swashplate not be perfectly adjusted for neutral.
- All hydro tests should be performed with the engine at high idle. Performance tests performed at lower idle speeds will result in poor transmission performance. Full transmission input shaft speed is needed to ensure full flow to overcome the IDS and reverse orifice bleed-off. Also, at lower engine speeds the transmission fan will rotate slower and the transmission may not be cooled properly, thus becoming sluggish.

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Hydrostatic System Operation



LEGEND:

A - Pump Input Shaft
B - Variable Displacement Swash Plate
C - Pump Rotating Group
D - Reservoir

E - Brake Disc
F - Motor Output Shaft
G - Fixed Displacement Swash Plate
H - Motor Rotating Group
I - Direction Control Arm

Function:

The hydrostatic transaxle provides a means of transferring power from the input sheave to the axle shafts of the transaxle. It also provides infinitely variable speed control and the capability of forward or reverse directional travel of the machine.

Theory of Operation:

As the input sheave is rotated by the traction drive belt it rotates the pump input shaft. The pump input shaft is splined to the pump rotating group. The pump rotating group is composed of an axial piston pump and a variable displacement swash plate. The pump rotating group provides oil under pressure to the motor rotating group. The motor rotating group is composed of an axial piston motor with a fixed position swash plate, and converts hydraulic energy into rotary motion, which is output through the motor output shaft. This rotary motion of the motor output shaft is the beginning of the gear power flow.

Neutral:

With the transmission in the neutral position, the variable swash plate is held perpendicular to the piston. Springs in the pump cylinder block force the pump pistons against the swash plate. Since the variable displacement swash plate is perpendicular to the axis of the pistons, there is no reciprocating motion of the pistons in the cylinders, and no oil is displaced.

Forward:

As the direction control arm is moved to the forward position, the variable swash plate is rotated from its neutral position.

As the swash plate angle increases, the pump pistons are forced in and out of the pump body as the piston block turns, displacing oil. As the pistons rotate, they follow the angled swash plate, and move outward in their bores, drawing in oil. As the pistons continue to rotate, the swash plate angle forces the pistons back into their bores, and oil is displaced through ports in the center case.

Pressurized oil from the pump forces the forward check valve closed and supplies high pressure oil to the motor rotating group.

The rotating group of the motor presses against a fixed angle swash plate. Oil enters the piston bore through a port in the center case at a point where the piston is compressed in its bore.

As the oil fills the piston bore, the piston is forced out and follows the angle of the fixed swash plate. This causes the motor rotating group to rotate. The motor rotating group is splined to the output shaft.

The piston continues to be forced out of its bore and follows the fixed angle swash plate until it is no longer aligned with the delivery port of the center case. Since oil is no longer being displaced to the piston, it no longer adds to the rotary motion of the motor. But, since the pistons next in line to it are now filling with oil, the rotary motion is continued.

As the motor continues to rotate, the pistons pass from the high pressure port to the low pressure port and, as the pistons are forced back into their bores by the angle of the swash plate, oil is forced from the piston bores through the center case and back to the inlet port of the pump. This is known as the low pressure side.

The oil path from the pump to the motor is known as the high pressure side because oil pressure increases, depending on the system load. The oil path from the motor back to the pump is known as the low pressure side. From forward drive to reverse drive these two paths switch, which gives opposite rotation to the motor.

Reverse:

The operation in reverse is the same as in forward. The only difference being that the variable displacement swash plate is rotated in the opposite direction, thus causing oil flow through the center case in the opposite direction.

Gear Power Flow Components Function:

The gear components transfer power from the output shaft of the motor to the drive axles and wheels. They also provide a means of making turns with differential action for smooth operation.

Gear Power Flow Theory of Operation:

The output shaft gear is splined to the hydrostatic motor output shaft. The output shaft gear meshes with the reduction gear which drives the reduction shaft. The reduction shaft drives the differential ring gear. Power is transferred from the ring gear to the differential pinion shaft and differential pinion gears. The differential bevel gears are splined to the axle shafts and transfer power directly out to the drive wheels.

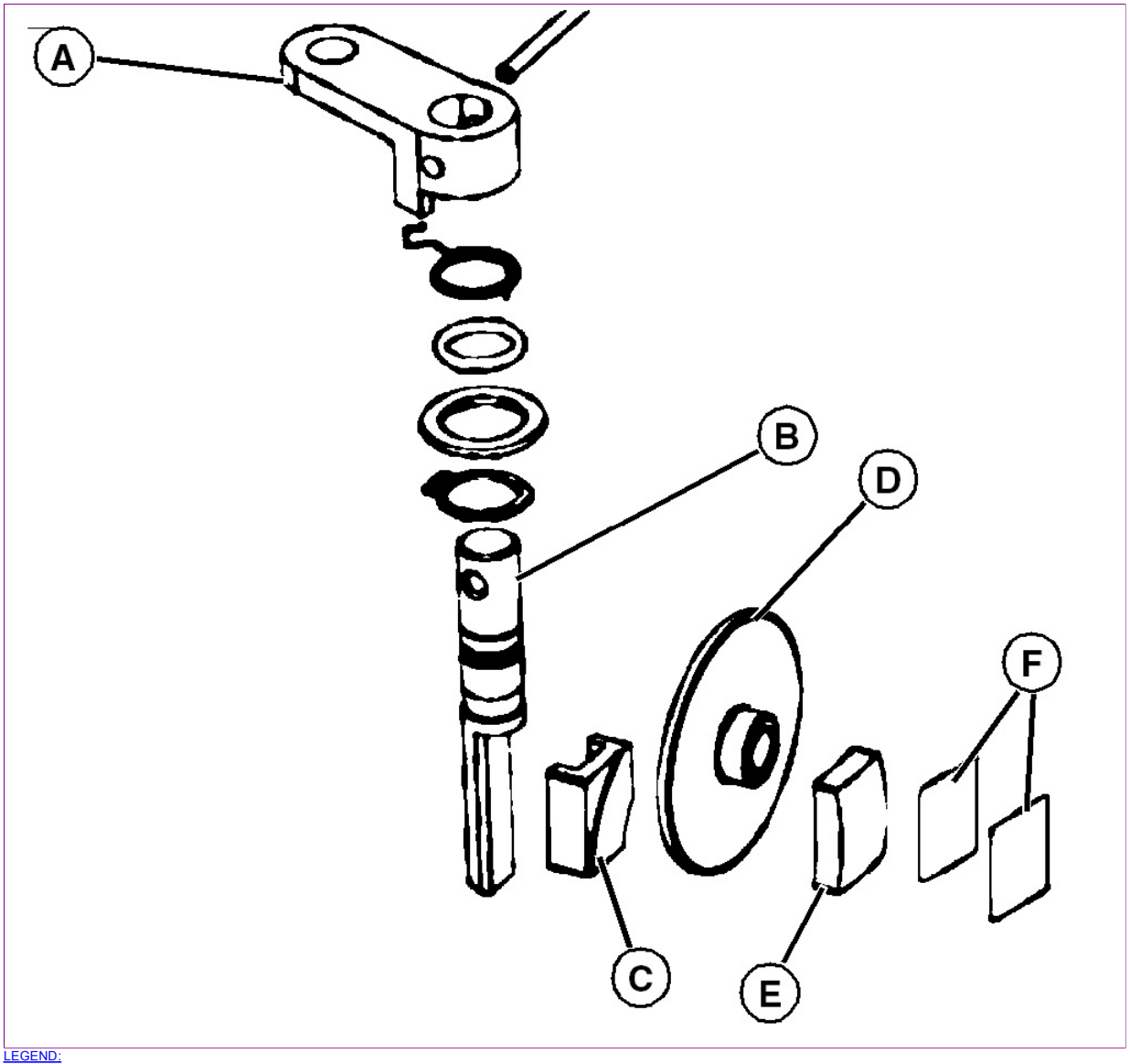
Splined to the end of the motor output shaft is the brake disc of the brake assembly. The brake is an internal wet disk brake.

When the brake is applied, a lever operated cam presses a brake shoe against the brake disk.

Brake Function:

To stop machine motion and disengage power from the engine to the transmission.

Brake Theory of Operation:



LEGEND:

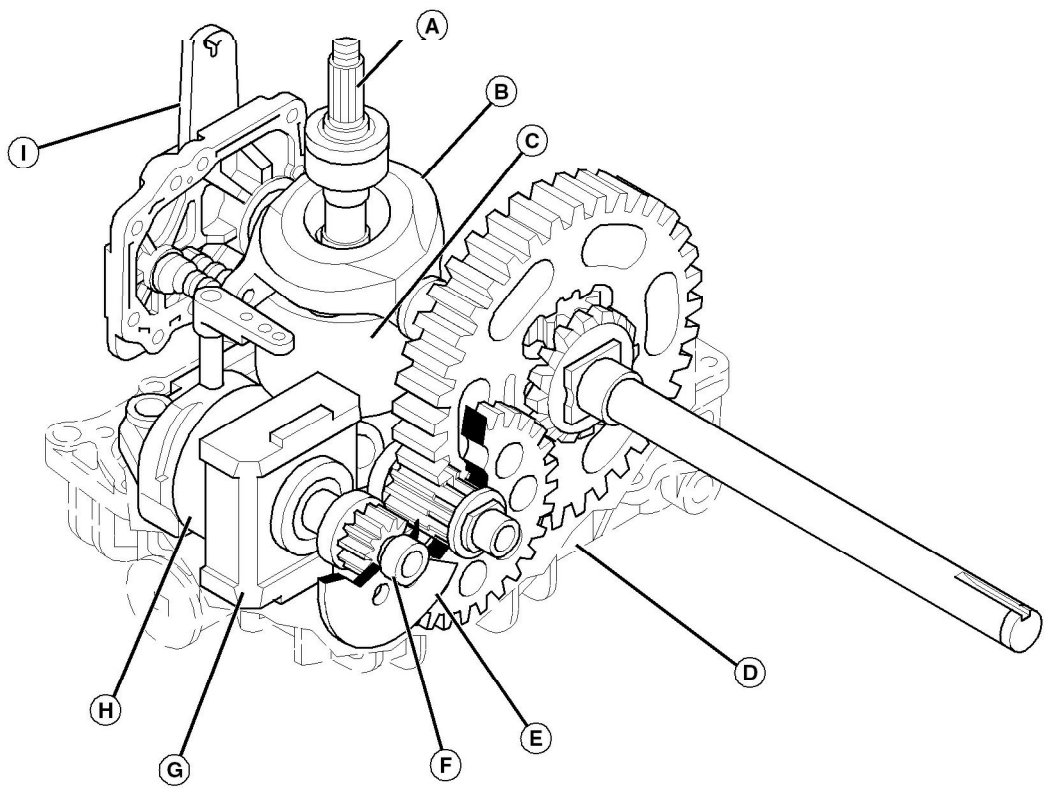
- A - Brake Arm
- B - Cam/Brake Shaft
- C - Brake Shoe
- D - Brake Disk
- E - Brake Shoe
- F - Shims

When the brake pedal is depressed, it rotates the brake pedal shaft forward. Attached to the shaft is the belt tension release rod. Movement of the shaft is transferred to the rod which engages the end of the slot in the idler arm assembly. Continued movement pulls the left side of the idler arm forward and disengages drive belt tension.

The transaxle brake is an internal wet disk brake. When the brake pedal is depressed or the parking brake is locked, the brake linkage rotates the brake arm.

The brake arm rotates the brake shaft and the brake shaft, acting as a cam, presses the brake shoe against the brake disk.

The brake disk is splined to the hydrostatic motor output shaft.


A
B
C
D
E
F
G
H
I

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Hydrostatic Transmission Check

Hydrostatic Transmission Check

Test Procedure:

Test Conditions:

- Machine on level surface.
- Engine OFF.
- Front wheels blocked.
- Rear wheels raised off surface with axle housings on jack stands.

1 Fan:

Action:

Is the fan in good condition and tight?

Result:

YES: Go to next step.

NO: Replace defective or worn components.

1 Drive Belt:

Action:

Is the drive belt in good condition and not glazed, split, unraveled, or stretched?

Result:

YES: Go to next step.

NO: Replace drive belt.

1 Idler Tensioning Spring:

Action:

Is the tensioning spring installed and not damaged?

Result:

YES: Go to next step.

NO: Install spring.

NO: Repair or replace.

1 Sheaves and Idlers, Belt Traction Drive System:

Action:

Are drive sheaves and idlers in good condition?

Result:

YES: Go to next step.

NO: Repair or replace.

Action:

Is the belt slipping, squealing, or vibrating excessively?

Result:

NO: Go to next step.

YES: Check belt condition. Check condition of idlers and guides. Adjust, repair or replace components as needed.

1 Hydro Housing Exterior:

Action:

Do the cooling fins have accumulated debris?

Result:

NO: Go to next step.

YES: Clean the cooling fins.

Action:

Does the hydro housing exterior have cracks, leaks, or loose hardware?

Result:

NO: Go to next step.

YES: Tighten hardware.

YES: Replace transaxle.

YES: Replace damaged components.

1 Axles:

Action:

Are the axles straight?

Result:

YES: Go to next step.

NO: Replace transaxle as needed.

1 Tires, Wheels, and Axles:

Action:

Are the tire pressures equal?

Result:

YES: Go to next step.

NO: Adjust air pressure.

Action:

Are the driving tires the same size?

Result:

YES: Go to next step.

NO: Install same size tires.

Action:

Are wheels bent or out of round?

Result:

NO: Go to next step.

YES: Replace wheels.

Action:

Are keys, keyways, and E-rings in good shape and seated correctly?

Result:

YES: Go to next step.

NO: Repair or replace as needed.

1 Engine Performance:

Action:

Is the engine running smoothly throughout throttle range, and is it being operated at high idle?

Result:

YES: Go to next step.

NO: Adjust, tune, or repair engine.

1 Stroking Control Arm: (Lack of Forward or Reverse Speed):

Action:

Is there lost motion between the control arm and shaft?

Result:

YES: Check roll pin for damage or shearing. Replace as necessary.

NO: Go to next step.

Action:

Does the linkage stroke control move until it reaches the stop inside the transaxle (Forward) and 2/3 stroke in reverse?

Result:

YES: Checks complete.

NO: Install adjustable motion control rod kit.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Hydrostatic Transmission Diagnosis

Hydrostatic Transmission Diagnosis

The transmissions use an internal dampening system (IDS) rather than an external hydraulic damper to provide smooth forward and reverse operation and speed change.

The IDS consists of small orifices in the hydro oil path that bleed-off pressure during the first few degrees of swash plate movement in forward and reverse to smooth directional changes. These orifices affect operation.

Perform a wheel spin test before troubleshooting the transmission.

Wheel Spin Test:

This test is best performed when the transmission oil is hot. This would be when the bottom transmission case is too warm to hold your hand on.

1. **IMPORTANT:**

   Do not perform this test by putting the front wheels of the machine against an immovable object. Front axle or steering damage could occur.

   Park machine safely on a rough concrete or paved surface and chain the rear tractor hitch to an immovable object.
2. At full engine speed with an operator on the seat, depress the forward pedal downward. The tractor tires should break traction and spin if the transmission has acceptable efficiency.

If the wheels will not spin and the engine is at full speed and the drive pedal fully depressed, the transmission is not functioning normally and requires further diagnosis.

Transmission troubleshooting should be performed using the following procedure.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Low Power When Hot

Low Power When Hot

Symptom	Problem	Solution
Transmission Has Low Power When Hot, Especially In Reverse	Does the travel pedal go all the way to the foot deck in forward?	Yes - Go to next step.
		No - Check for bent or damaged linkage. Repair or replace as necessary.
		No - Check for damaged or sheared roll pin at control arm to transaxle control shaft junction. Replace as necessary.
	Does the machine have full forward power when the pedal is pressed to the floor?	Yes - Go to next step.
		No - Is the freewheel rod pushed in fully?
		No - Check traction belt and traction drive belt tensioner.
		No - Check neutral creep adjustment. See Neutral Creep Adjustment .
	Does the pedal move down approximately 2/3 of the way down in reverse, but still has low power with the engine at high idle and the transmission oil hot?	Yes - Check for lost motion of control lever on transmission due to wear of linkage parts. Repair as needed.
		No - Is the oil level correct (20-25 mm (0.5-0.75 in.) below the top of the transmission case) and is the oil viscosity correct? Note: Fenderdeck has to be removed to check oil level.
		No - Replace transmission.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Will Not Move Forward or Reverse

Will Not Move Forward or Reverse

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Machine Will Not Move Forward or Reverse	Is the freewheeling lever disengaged?	Yes - Go to next step.
		No - Disengage freewheeling lever.
	Is the park brake locked?	Yes - Unlock park brake.
		No - Go to next step.
	Is the traction belt worn, frayed, glazed or stretched?	Yes - Replace traction belt. See Traction Drive Belt Removal and Installation .
		No - Go to next step.
	Is the traction belt properly tensioned?	Yes - Go to next step.
		No - Check belt tensioning spring and belt. Replace worn/ damaged/missing parts.
	Hydrostatic transaxle oil to full mark?	Yes - Go to next step.
		No - Fill reservoir to correct level with specified oil.
	Is the brake linkage properly adjusted?	Yes - Go to next step.
		No - Adjust brake linkage.
	Are the brake rod and lever damaged or binding?	Yes - Eliminate binding, replace damaged components.
		No - Go to next step.
	Does the forward/reverse pedal linkage move freely?	Yes - Go to next step.
		No - Eliminate binding, replace faulty or damaged components.
	Are the control arm and spring pin intact and present?	Yes - Go to next step.
		No - Replace control arm and/or spring pin.

Are the engine and transaxle drive sheaves intact, and are the keys or keyways damaged?	Yes - Replace sheaves or keys. No - Go to next step.
Idler arm assembly pivots freely, no wear in bearing?	Yes - Go to next step. No - Lubricate and/or replace assembly.
Belt idler assembly tension spring maintains tension on belt?	Yes - Go to next step. No - Replace tensioning spring.
Freewheel linkage components move freely and are not damaged?	Yes - Go to next step. No - Eliminate binding and/or replace damaged components.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Machine Moves In One Direction Only

Machine Moves In One Direction Only

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Machine Moves In One Direction Only	Is the forward/reverse pedal linkage properly adjusted?	Yes - Go to next step.
		No - Adjust linkage.
	Does the forward/reverse pedal linkage move freely?	Yes - Go to next step.
		No - Eliminate binding, replace faulty or damaged components.
	Is the control arm free of damage?	Yes - Go to next step.
		No - Replace control arm and/or spring pin.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Machine Does Not Achieve Full Speed

Machine Does Not Achieve Full Speed

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Machine Does Not Achieve Full Speed	Is the park brake locked?	Yes - Unlock park brake.
		No - Go to next step.
	Transaxle free of debris?	Yes - Go to next step.
		No - Remove debris from transaxle.
	Cooling fan damaged?	Yes - Replace cooling fan.
		No - Go to next step.
	Is the traction belt worn, frayed, glazed or stretched?	Yes - Replace traction belt. See Traction Drive Belt Removal and Installation .
		No - Go to next step.
	Is the traction belt properly tensioned?	Yes - Go to next step.
		No - Check belt tensioner and spring for binding or damage. Repair as needed
	Freewheel linkage and lever move freely and are not damaged?	Yes - Go to next step.
		No - Eliminate binding and/or replace damaged components.
	Does the forward/reverse pedal linkage move freely?	Yes - Go to next step.
		No - Eliminate binding, replace faulty or damaged components.
	Brake linkage adjusted properly, brake rod and lever not damaged or binding?	Yes - Go to next step.
		No - Adjust brake linkage.
	Hydrostatic reservoir oil at full mark, at operating temperature, clean and not foamy?	No - Fill reservoir to correct level. Drain transaxle and fill to correct level with specified oil. Bleed air from system.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Noisy Operation

Noisy Operation

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Noisy Operation	Park brake unlocked?	Yes - Go to next step.
		No - Unlock park brake.
	Brake linkage adjusted properly, brake rod and lever not damaged or binding?	Yes - Go to next step.
		No - Adjust brake linkage. Eliminate binding and/or replace damaged components.
	Freewheel linkage and lever move freely and are not damaged?	Yes - Go to next step.
		No - Eliminate binding and/or replace damaged components.
	Hydrostatic reservoir oil at full mark, at operating temperature, clean and not foamy?	No - Fill reservoir to correct level. Drain transaxle and fill to correct level with specified oil. Bleed air from system.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Machine Creeps

Machine Creeps

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Machine Creeps	Is the forward/reverse pedal linkage properly adjusted?	Yes - Go to next step. No - Adjust linkage. See Brake Adjustment - Hydro in the Brakes section.
	Does the forward/reverse pedal linkage move freely?	Yes - Go to next step. No - Eliminate binding, replace faulty or damaged components.
	Are the control arm and spring pin intact and present?	Yes - Go to next step. No - Replace control arm and/or spring pin.
	Is the neutral eccentric properly adjusted for no wheel movement at fast idle?	No - Adjust neutral eccentric. See Neutral Creep Adjustment .

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Erratic Speed

Erratic Speed

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Erratic Speed	Is the traction belt worn, frayed, glazed or stretched?	Yes - Replace traction belt. See Traction Drive Belt Removal and Installation .
		No - Go to next step.
	Is the traction belt properly tensioned?	Yes - Go to next step.
		No - Check belt tensioner and spring for binding or damage. Repair as needed
	Brake linkage adjusted properly, Brake rod and lever not damaged or binding?	Yes - Go to next step.
		No - Adjust brake linkage. See Brake Adjustment - Hydro in the Brakes section. Eliminate binding and/or replace damaged components.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake Switch Will Not Engage

Brake Switch Will Not Engage

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Brake Switch Will Not Engage	Is transaxle free of debris?	Yes - Go to next step.
		No - Remove debris from transaxle.
	Is the forward/reverse pedal linkage properly adjusted?	Yes - Go to next step.
		No - Adjust linkage.
	Does the forward/reverse pedal linkage move freely?	Yes - Go to next step.
		No - Eliminate binding, replace faulty or damaged components.
	Brake linkage adjusted properly, brake rod and lever not damaged or binding?	Yes - Go to next step.
		No - Adjust brake linkage. See Brake Adjustment - Hydro in the Brakes section. Eliminate binding and/or replace damaged components.
	Does the brake switch have continuity with park brake locked?	Yes - Go to next step.
		No - Test brake switch. See PTO/Brake Switch Test in Electrical section. Replace switch as needed.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Park Brake Does Not Hold Machine

Park Brake Does Not Hold Machine

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Park Brake Does Not Hold Machine	Brake pedal and linkage are damaged, worn, or binding?	Yes - Eliminate binding and/or replace damaged components.
		No - Go to next step.
	Park brake lever and linkage are damaged, worn, or binding?	Yes - Eliminate binding and/or replace damaged components.
		No - Go to next step.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Transaxle Whines When Brake Is Used

Transaxle Whines When Brake Is Used

Test Conditions:

- Machine on level surface.
- Key switch in run position.
- Park brake unlocked.
- Transaxle in neutral.

Symptom	Problem	Solution
Transaxle Whines When Brake Is Used	Transaxle whines when brake is used, or park brake is locked?	Yes - Adjust neutral return arm bearing.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Traction Drive System Test

Traction Drive System Test

Reason:

To ensure forward drive, neutral return, brake linkages and belt drive system maintain traction up a 17 slope.

To ensure that transport (freewheeling) valve assembly and linkage allow machine to be pushed when engaged (rod pulled rearward) and to drive machine when disengaged. Also to ensure machine returns to NEUTRAL, engages the brake, stops machine within specification, and holds machine stationary in PARK position on a 17 slope or less.

Test Drive:

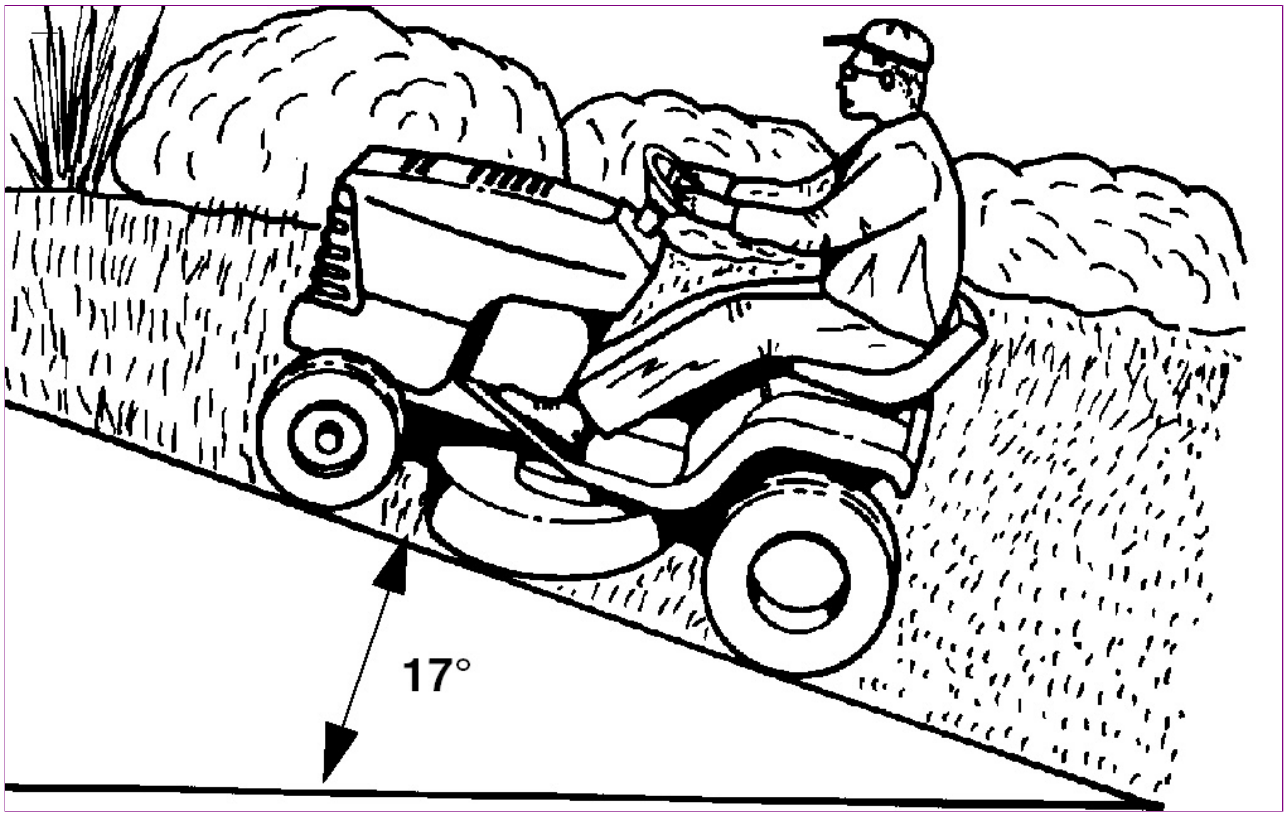
CAUTION:

Help prevent severe bodily injury or death.

- ***Do not engage forward foot pedal too aggressively during the 17 slope test drive. Machine may tip over backwards.***

  Install the mower deck for added stability.

1. Attach mower deck to machine.
2. Carefully test drive machine to see if traction drive system pulls machine steadily up a 17 slope.
3. If machine fails traction test, the drive belt may be worn, stretched, glazed or unraveling. Replace belt or other worn parts if above conditions exist.



4. Drive or push machine onto a 17 slope, depress the brake pedal and lock it in the PARK position.
5. FORWARD and REVERSE pedals must return to NEUTRAL. Park brake must hold machine in a stationary position on slope and machine must not creep downward once park brake is locked into position.
6. Drive machine on dry pavement in a safe, open and level area at fast idle in the forward direction. Apply “panic stop” force - machine must stop within 1.5 M (5 ft) and both wheels should “lock-up”, leaving skid marks on pavement.
7. If any test fails, the brake linkage or the motion control rod (if adjustable) must be adjusted or components replaced.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Neutral Creep Adjustment

Neutral Creep Adjustment

Reason:

If the machine creeps forward or backward with the forward/reverse pedals in NEUTRAL, parking brake released, and the engine running, the neutral eccentric must be adjusted.

Procedure:

1. Park machine on level surface.
2. Turn key switch to STOP.
3. Move forward/reverse pedals to NEUTRAL position. Release parking brake.
4. ***CAUTION:***

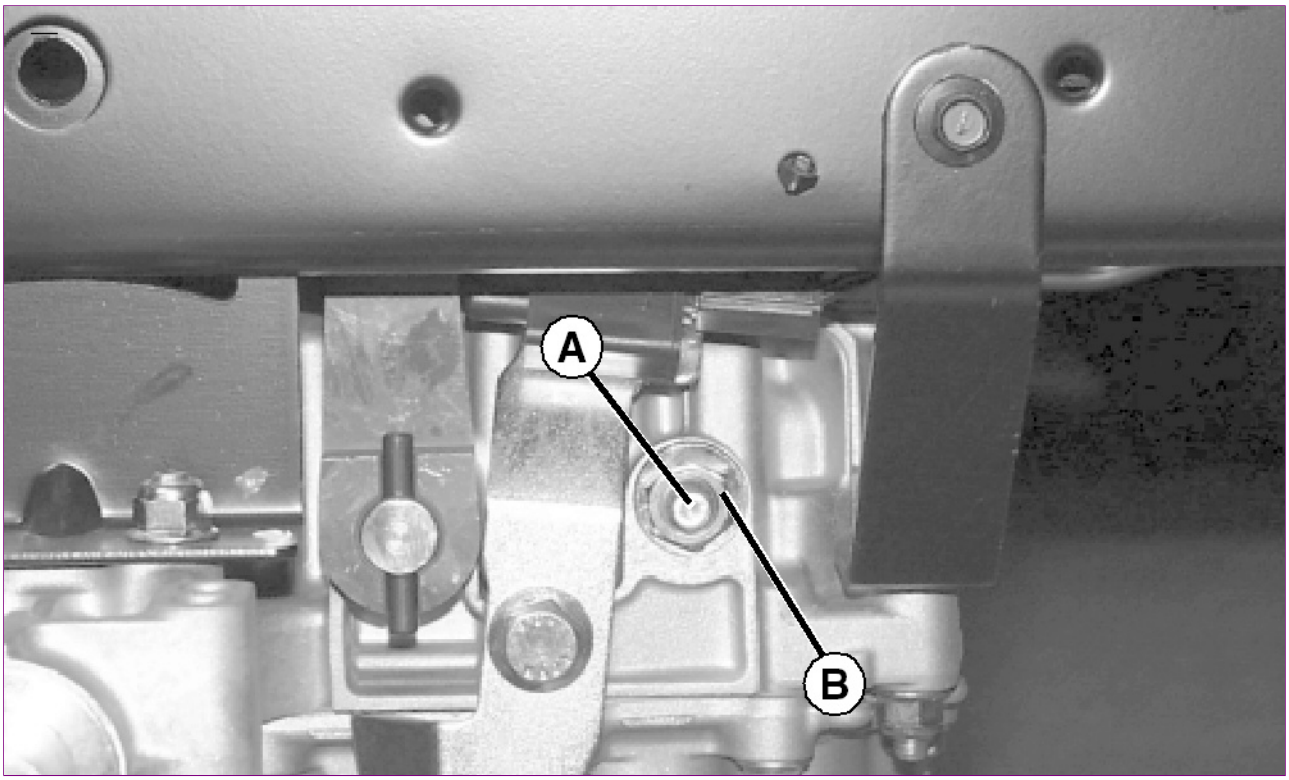
   Use extreme caution when adjusting for neutral creep. Drive wheels are free to spin when machine is raised off the floor and the engine is started.

   Lift rear of machine until wheels are off the ground. Support on suitable stands.
5. *NOTE:*

   The eccentric shaft is located on the right side of the transaxle above and in front of the axle.

   Place blocks in front of and behind front wheels.
6. *NOTE:*

   Engine will not start with seat switch disconnected. Use a jumper wire to bypass switch.

   Start and run engine at FAST idle.
7. 

   Loosen lock nut (B) on eccentric (A). Rotate eccentric to eliminate neutral creep.
8. Hold eccentric in position with a wrench. Tighten lock nut.
9. Remove seat switch jumper wire and reconnect seat switch.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Transport (Freewheel) Test

Transport (Freewheel) Test

Reason:

To ensure that machine can be moved manually without damage to transaxle when freewheel rod is pulled.

Procedure:

IMPORTANT:

To prevent damage to hydrostatic transmission, do not operate freewheel valve with engine running.

1. Release park brake.
2. 

With engine OFF and forward/reverse pedals disengaged, pull freewheel rod (A) out to the freewheel position.
3. Push machine forward at least 3.0 m (10 ft). Machine should push easily the entire distance.
4. Push machine backwards the same distance. Machine should push easily the entire distance.
5. If machine pushes hard in either direction, internal components could be damaged or worn. Inspect freewheeling linkage or replace transaxle.

IMPORTANT:

After using transport (freewheel), be sure to push engagement rod completely back into machine. If not completely engaged, the transaxle will not operate properly, will be excessively noisy, and could be damaged.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Transaxle Bleeding

Transaxle Bleeding

Reason:

This procedure is performed to eliminate air from the hydrostatic transaxle after repair or leakage of the transaxle.

Checking and Filling Transaxle Level Procedure: **IMPORTANT:**

Use ONLY the following oils for service. DO NOT use automatic transmission fluid.

NOTE:

The transmission is filled with 10W30 engine oil at the factory.

For transmissions used in extreme or high-hour applications, J20C Hygard Hydraulic oil or 5W-50 Synthetic Engine Oil is approved as an optional fill. Use only after a complete drain of the factory oil.

1. Park machine safely on a level surface with park brake locked.
2. Remove battery.
3. Remove steering shaft and pedestal. See Steering Shaft and Pedestal Removal and Installation in the Steering section.
4. Remove fenderdeck. See Fenderdeck Removal and Installation in the Miscellaneous section.
5. Remove fuel tank. See Fuel Tank Removal and Installation in the Miscellaneous section.
6. Check transaxle oil level. If necessary, fill transaxle approximately 13 mm (0.5 in.) from the top of the transmission case. This is roughly halfway up the round cavity.
7. Replace cap and install all removed components.

Bleeding Procedure:

1. Raise rear wheels off the ground. Support rear axle housing with jack stands.
2. Place blocks in front of and behind front wheels.
3. Start and run engine at slow idle.
4.

CAUTION:

Moving parts can crush and cut. Keep loose clothing, hands and feet away from wheels during procedure to reduce the risk of personal injury.

While alternately depressing the forward and reverse pedals, engage and disengage the freewheel valve lever. Continue this procedure until the rear wheels start to rotate. This step may take 5 to 10 minutes to perform.

5. Turn off engine.
6. Raise rear of machine, remove stands, and lower the machine to the ground.
7. Remove blocks in front of and behind front wheels.
8. With engine off and control pedals in neutral, push the machine forward and then rearward to turn the motor rotating group.
9. Start and run the engine at fast idle.

10. Quickly depress and release the forward and reverse pedals until the machine moves without hesitation.
11. Park machine safely. See Parking Safely in the Safety Section.

Results:

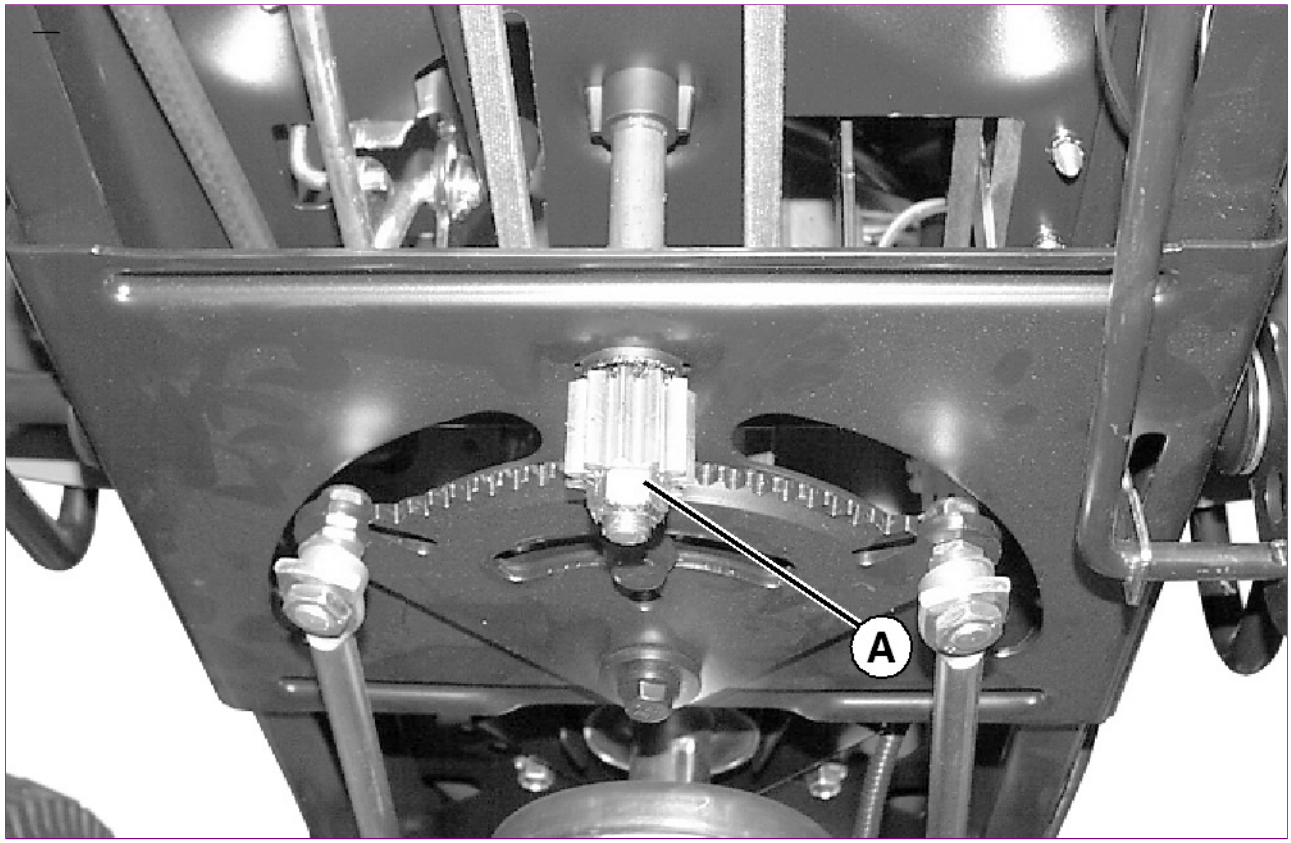
- Machine moves without hesitation when forward or reverse pedals are depressed.

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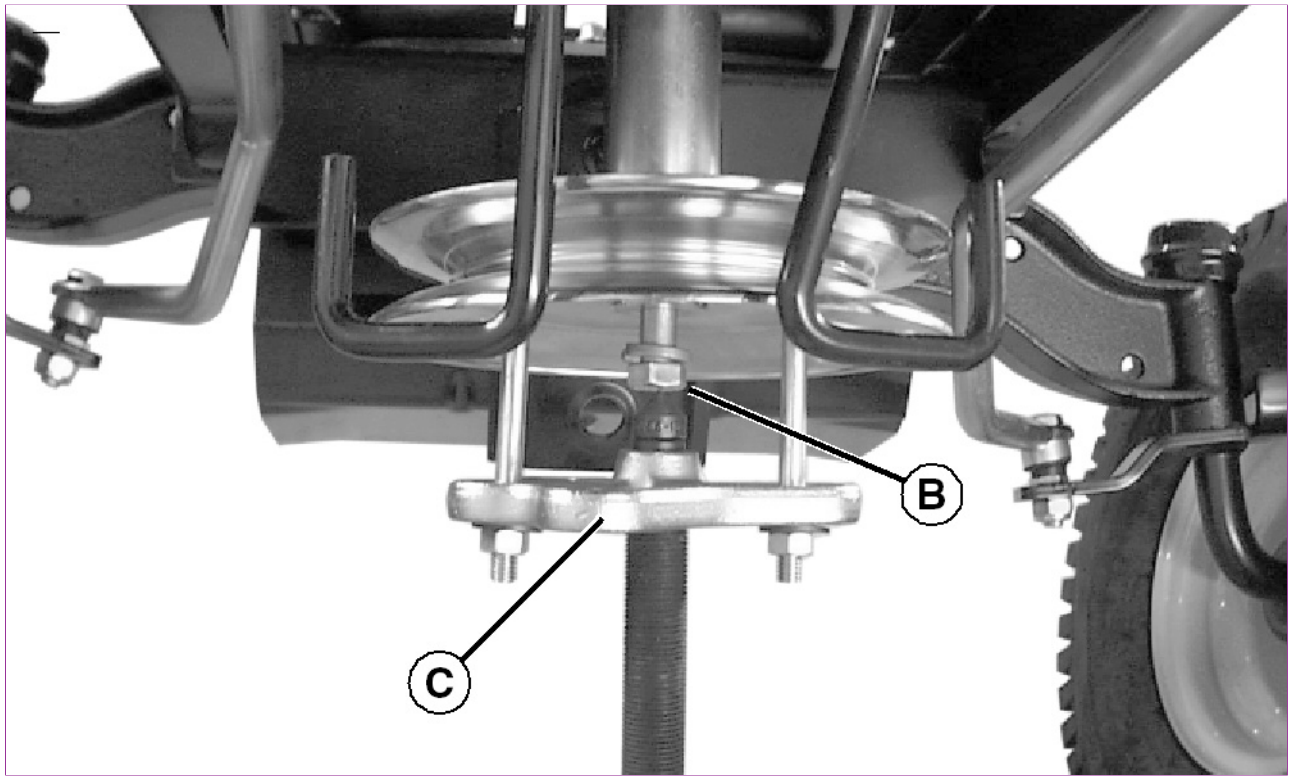
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Traction Drive Belt Removal and Installation - LA115, 125, 135 and 145

Traction Drive Belt Removal and Installation - LA115, 125, 135 and 145

Removal:

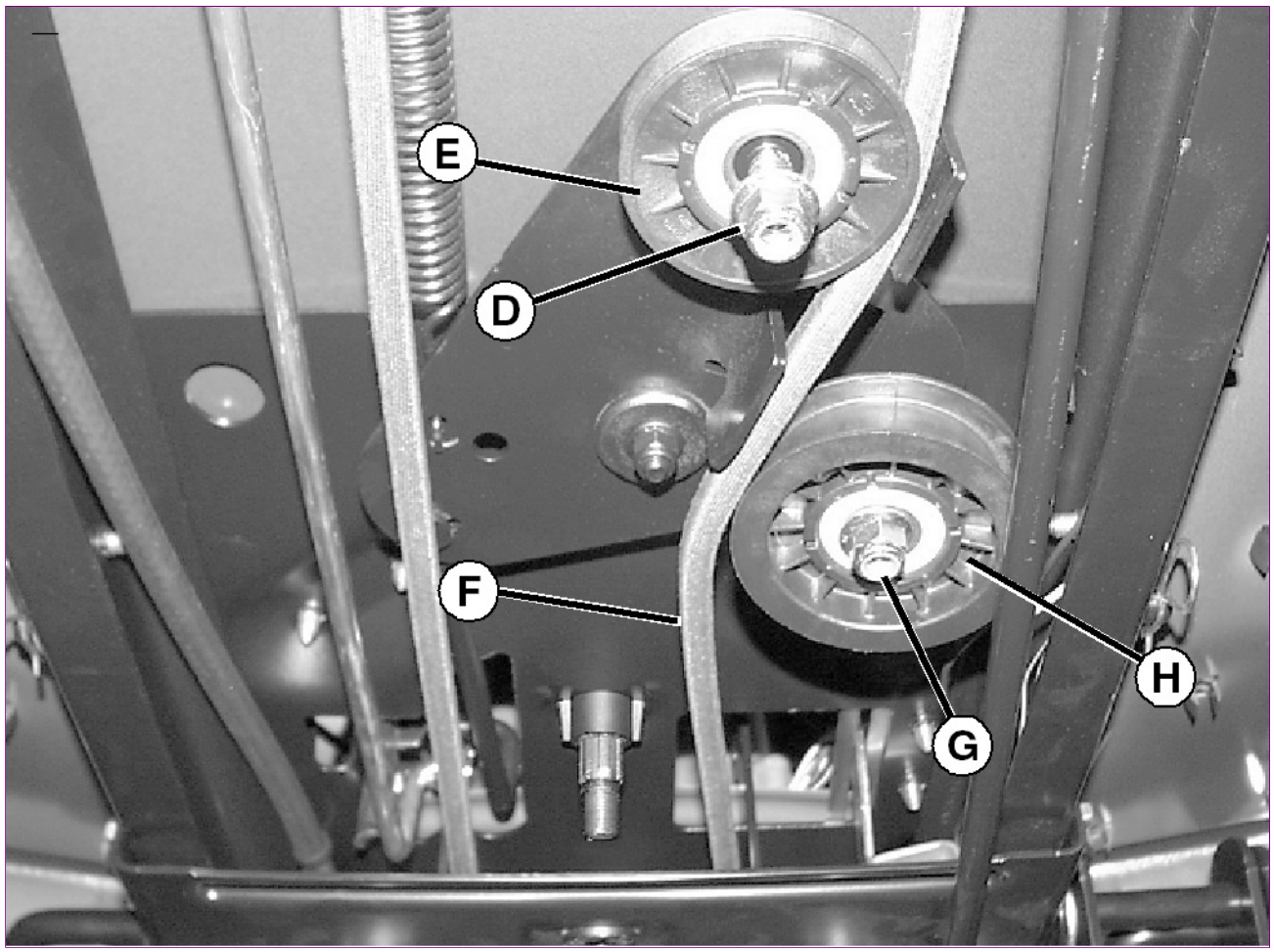
1. Park machine on a level surface. Turn engine OFF and remove ignition key.
2. Remove mower deck. See Removing Mower Deck in the Attachments section.
3. Engage park brake to relieve tension on traction drive belt.
4. Raise rear of machine. Support on jack stands.
5. 

Remove nut and steering gear (A).

6. 

Loosen sheave cap screw (B) until threads no longer engage in engine output shaft, Remove sheave assembly with a suitable puller, (C) while simultaneously removing drive belt from around engine sheave.

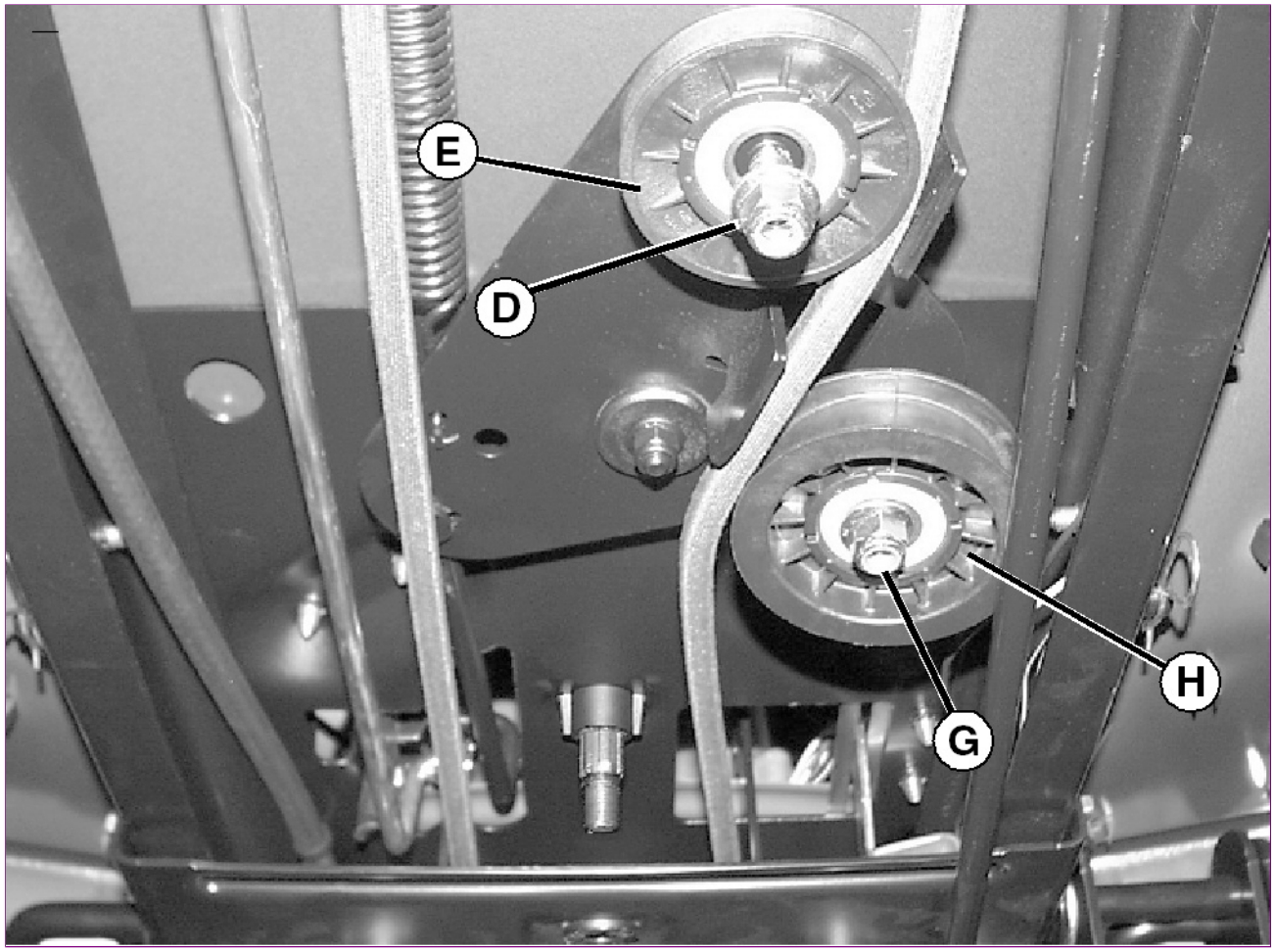
7. Raise steering shaft only enough to clear belt.

8. 

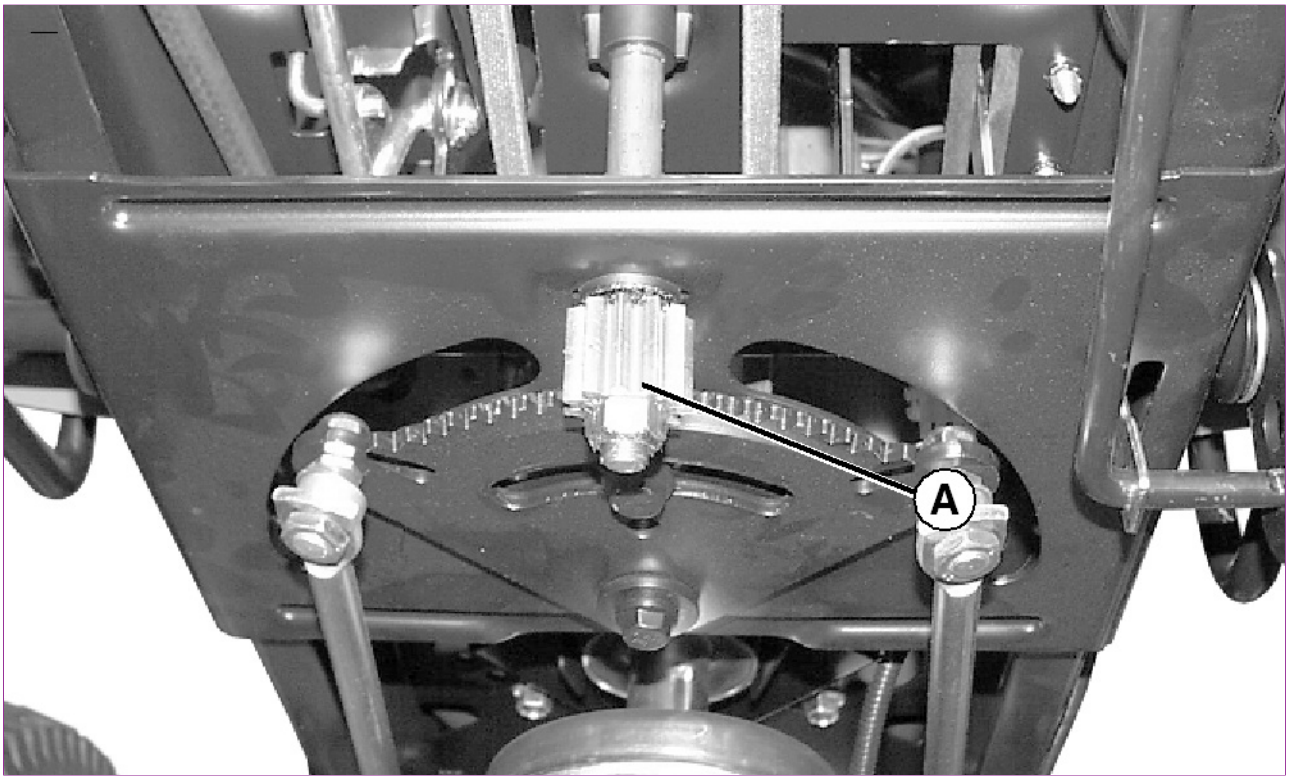
Loosen nut (D) on V-Idler (E), and remove belt (F) from around V-Idler.

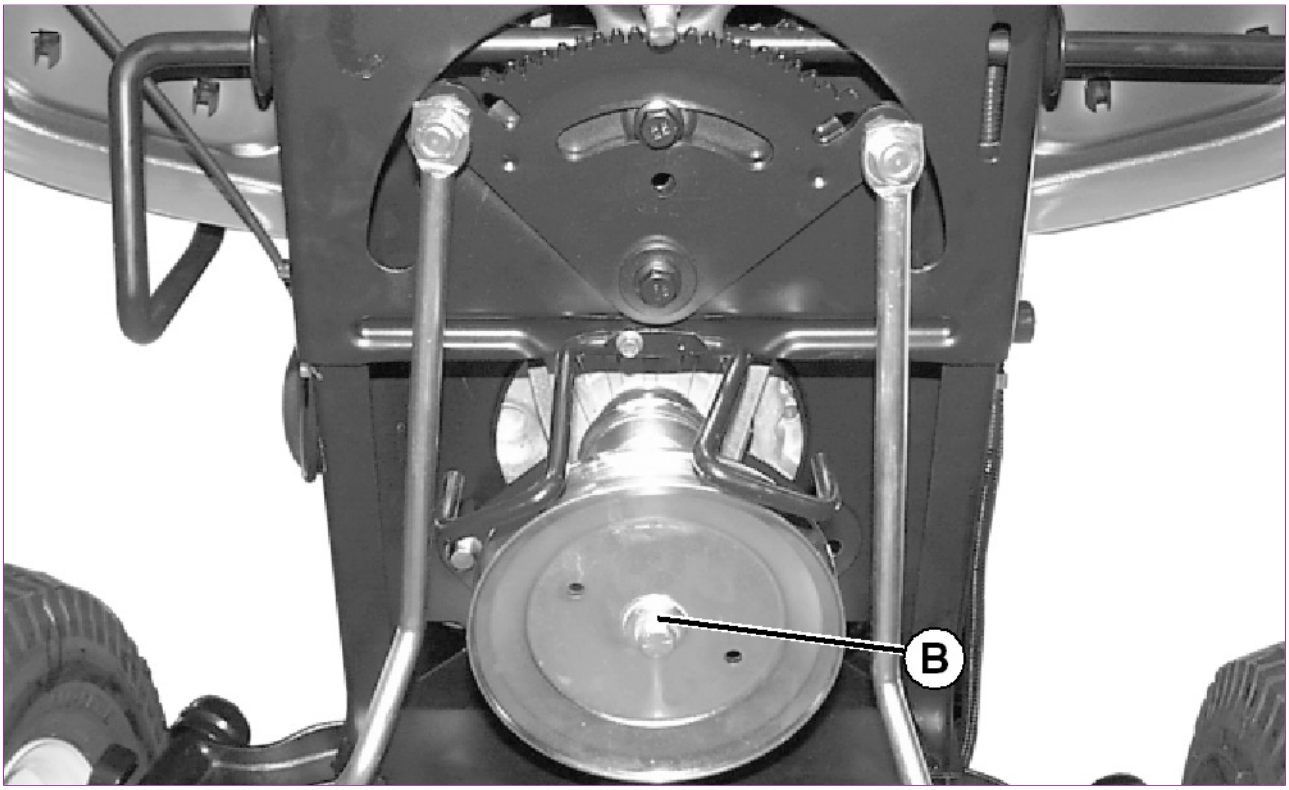
9. Loosen nut (G) on flat idler (H). Remove belt from around flat idler.
10. Remove belt from transaxle sheave and machine.
11. Inspect belt for wear or damage. Replace as necessary.

Installation:

1. 

Guide belt toward front of machine and around flat idler (H). Tighten nut (G) securing idler to tensioning bracket.
2. Guide the belt around V-Idler (E). Tighten nut (D) securing idler to tensioning bracket.

3. 

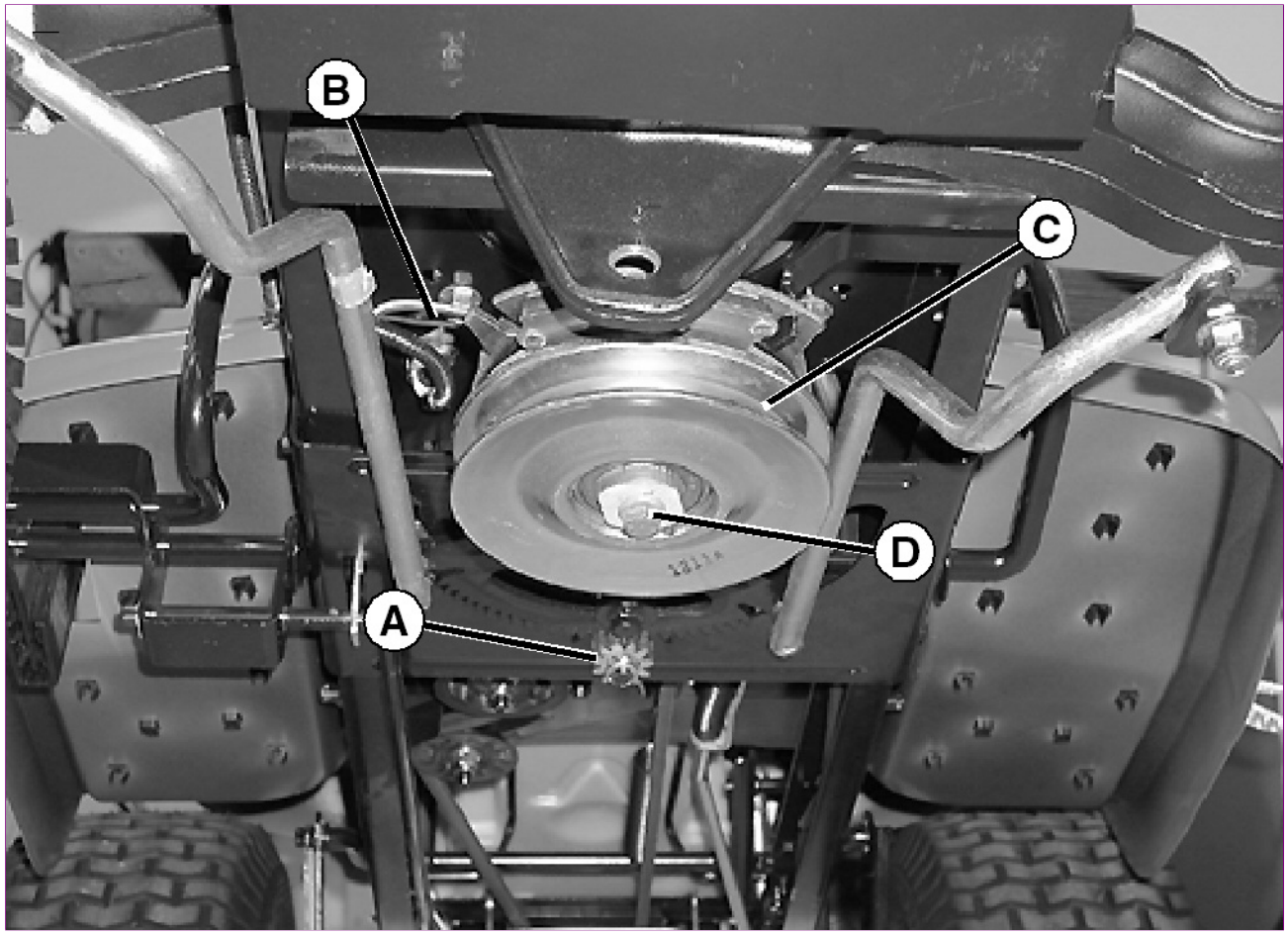
With steering shaft raised, guide the belt under frame past steering shaft towards engine output shaft. Lower steering shaft, install gear (A). Secure with nut.
4. Install traction drive belt (E) around engine sheave.
5. 

Install engine output shaft key, engine sheave, and bolt (B).
6. Disengage parking brake.
7. Test function by pressing brake pedal (releasing tension on belt). Make sure belt is running on all idlers/sheaves.
8. Lower machine and install mower deck. See Installing Mower Deck in the Attachments section.

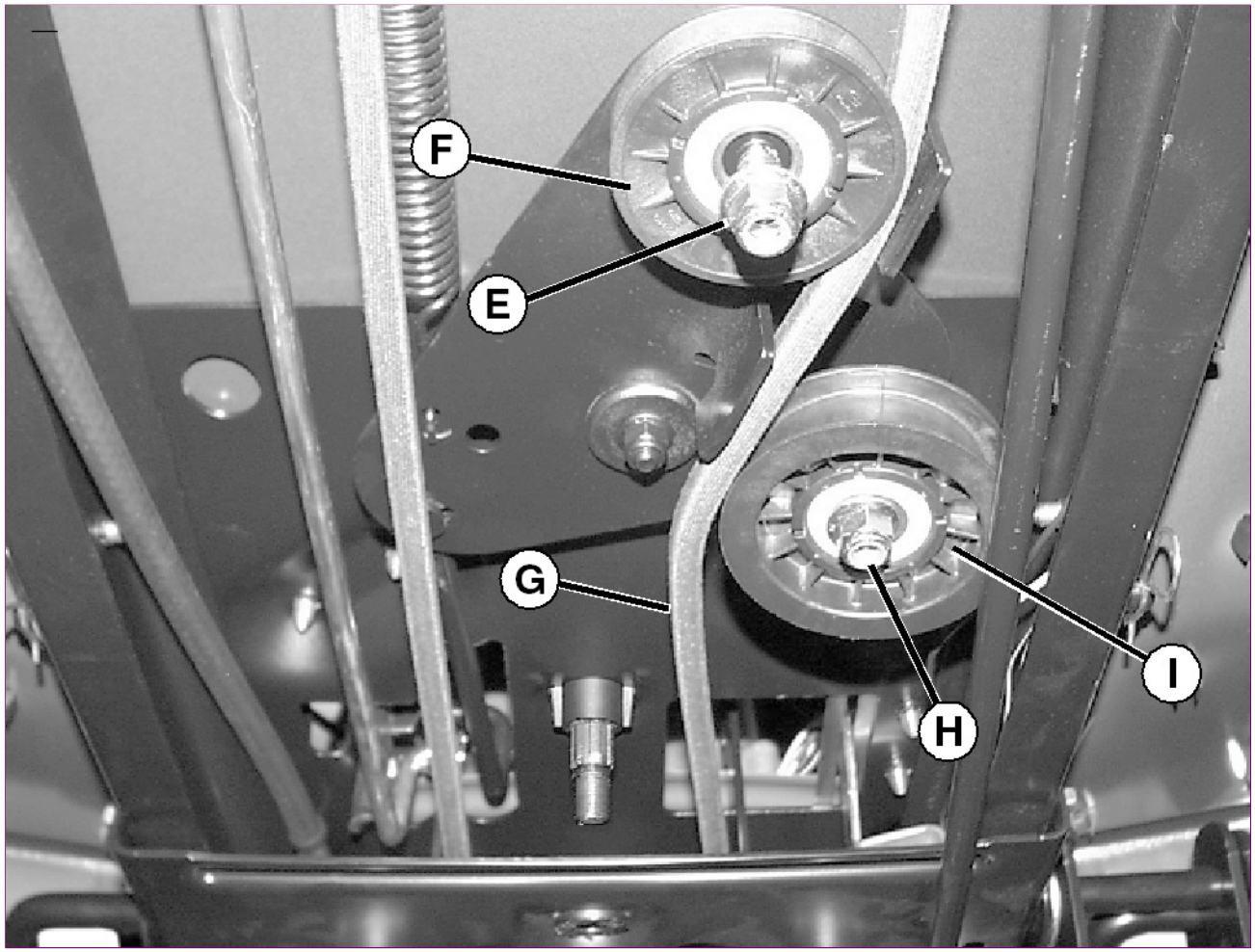
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Traction Drive Belt Removal and Installation - LA155, 165 and 175

Traction Drive Belt Removal and Installation - LA155, 165 and 175

Removal:

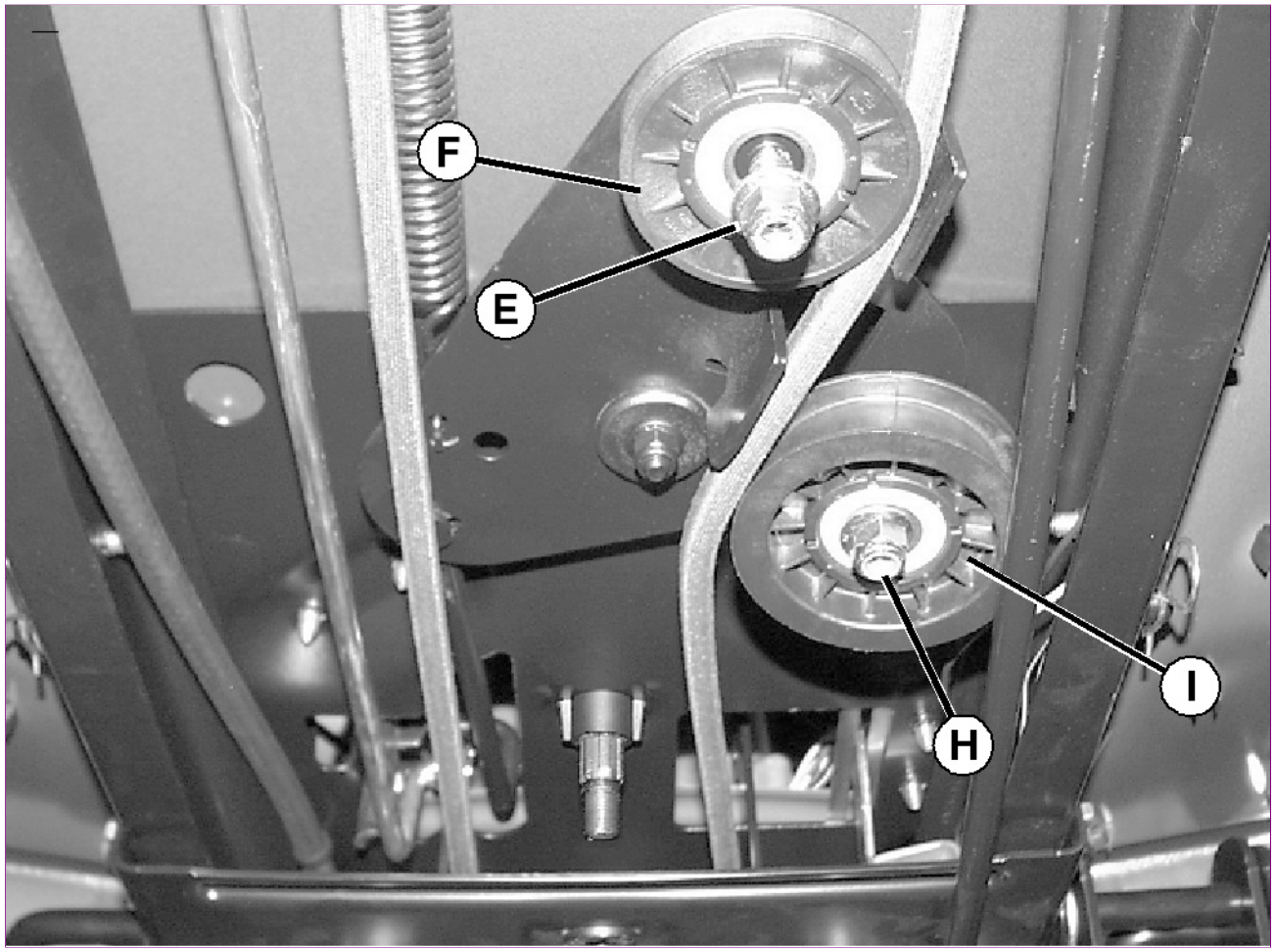
1. Park machine on a level surface. Turn engine OFF and remove ignition key.
2. Remove mower deck. See Removing Mower Deck in the Attachments section.
3. Engage park brake to relieve tension on traction drive belt.
4. Raise rear of machine. Support on jack stands.
5. 

Remove nut and steering gear (A).
6. Disconnect wiring harness (B) from electric PTO clutch (C).
7. With parking brake locked, remove cap screw (D) and lock washer securing electric clutch and engine sheave assemblies to engine output shaft. Remove electric clutch (C) and engine sheave assemblies, while simultaneously removing drive belt from around engine sheave.
8. Raise steering shaft only enough to clear belt (E).

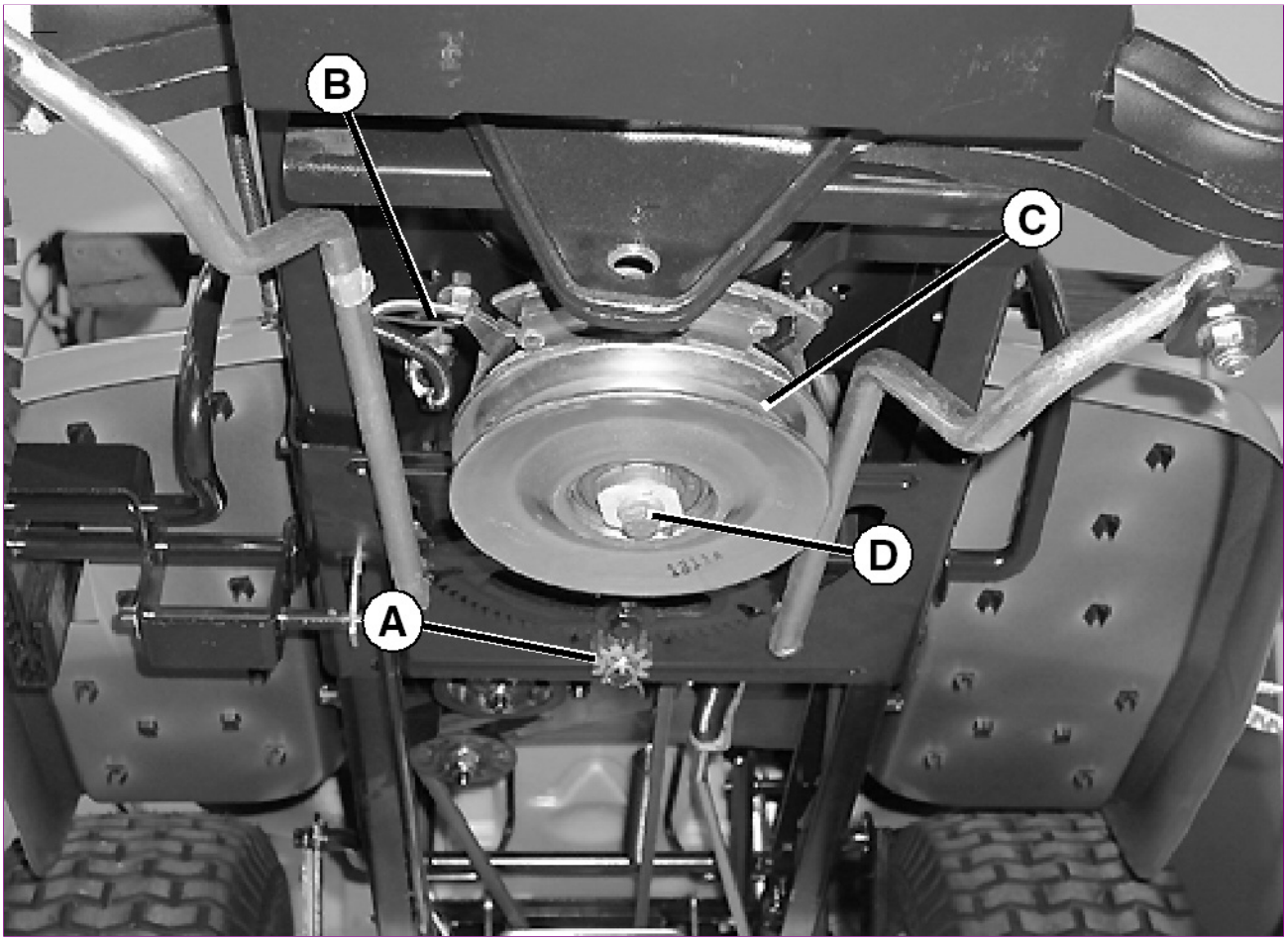


9. Loosen nut (E) on V-Idler (F), and remove belt (G) from around V-Idler.
10. Loosen nut (H) on flat idler (I). Remove belt from around flat idler.
11. Remove belt from transaxle sheave and machine.
12. Inspect belt for wear or damage. Replace as necessary.

Installation:



1. Guide belt toward front of machine and around flat idler (I). Tighten nut (H) securing idler to tensioning bracket.
2. Guide the belt around V-Idler (F). Tighten nut (E) securing idler to tensioning bracket.



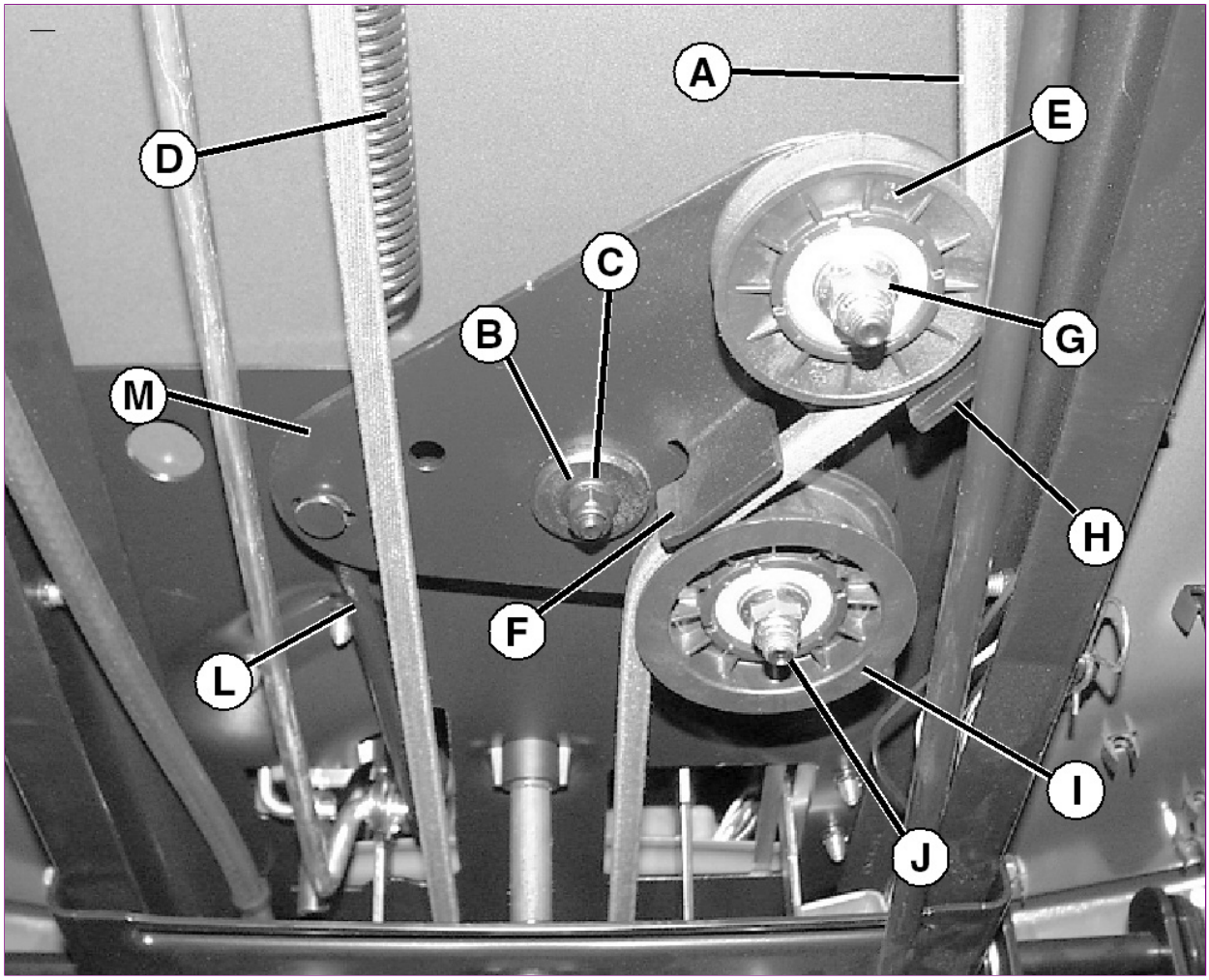
3. With steering shaft raised, guide the belt under frame past steering shaft towards engine sheave. Lower steering shaft, install gear (A). Secure with nut.
4. Install engine output shaft key and engine sheave.
5. Install electric PTO clutch (C). Secure with lock washer and cap screw (D). Tighten cap screw to **75 N•m (55 lb-ft)** .
6. Install traction drive belt (E) around engine sheave.
7. Connect wiring harness (B) to electric PTO clutch.
8. Disengage parking brake.
9. Test function by pressing brake pedal (releasing tension on belt). Make sure belt is running on all idlers/sheaves.
10. Lower machine and install mower deck. See Installing Mower Deck in the Attachments section.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Traction Drive Belt Tensioner Removal and Installation

Traction Drive Belt Tensioner Removal and Installation

Removal:

1. Park machine on a level surface. Turn engine OFF. Remove ignition key.
2. Remove mower deck. See Removing Mower Deck in the Attachments section.
3. Engage park brake to relieve tension on traction drive belt.

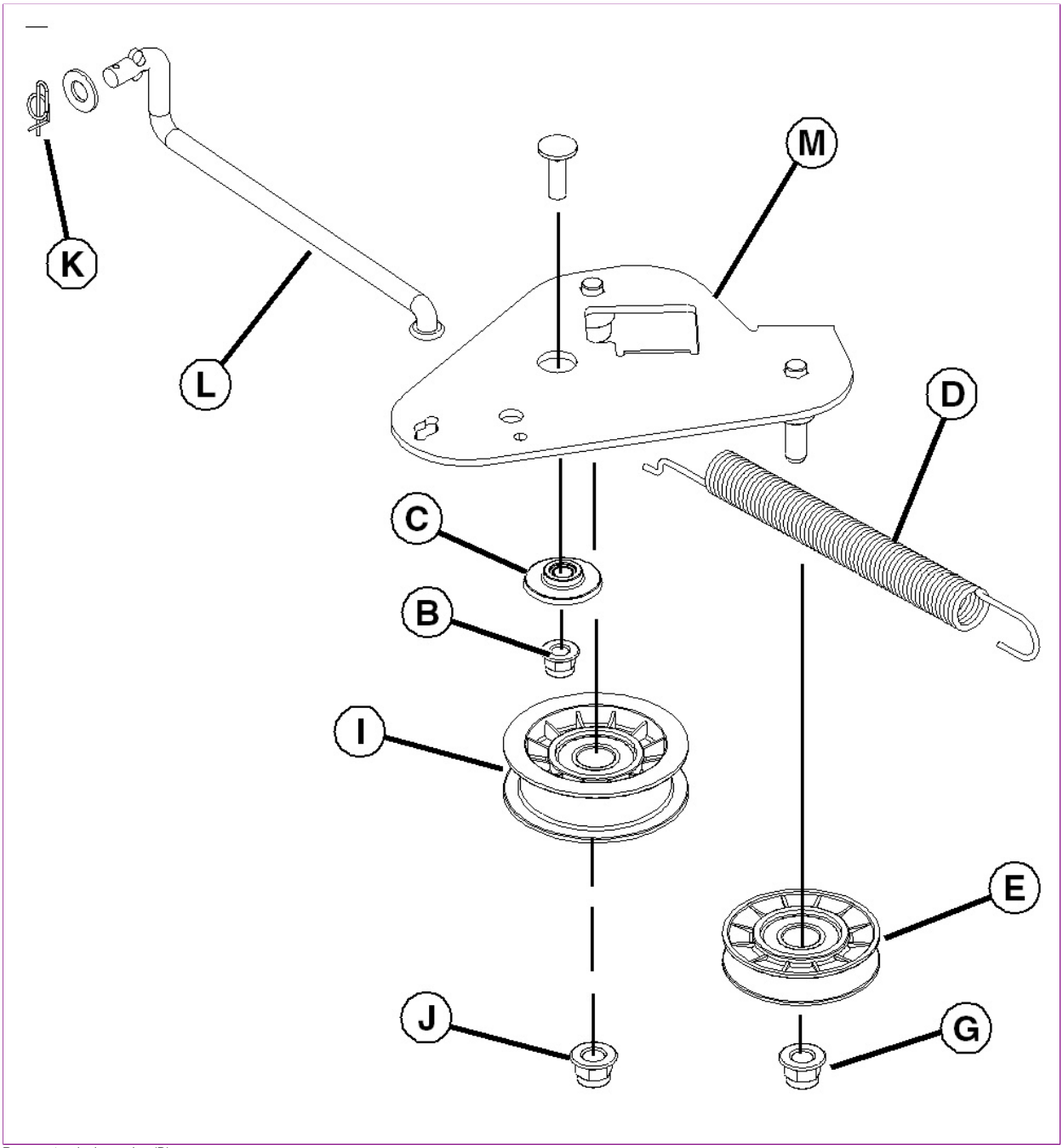


4. Loosen nut (G) on V-Idler (E). Remove belt (A) from around idler and idler guide (H).
5. *NOTE:*

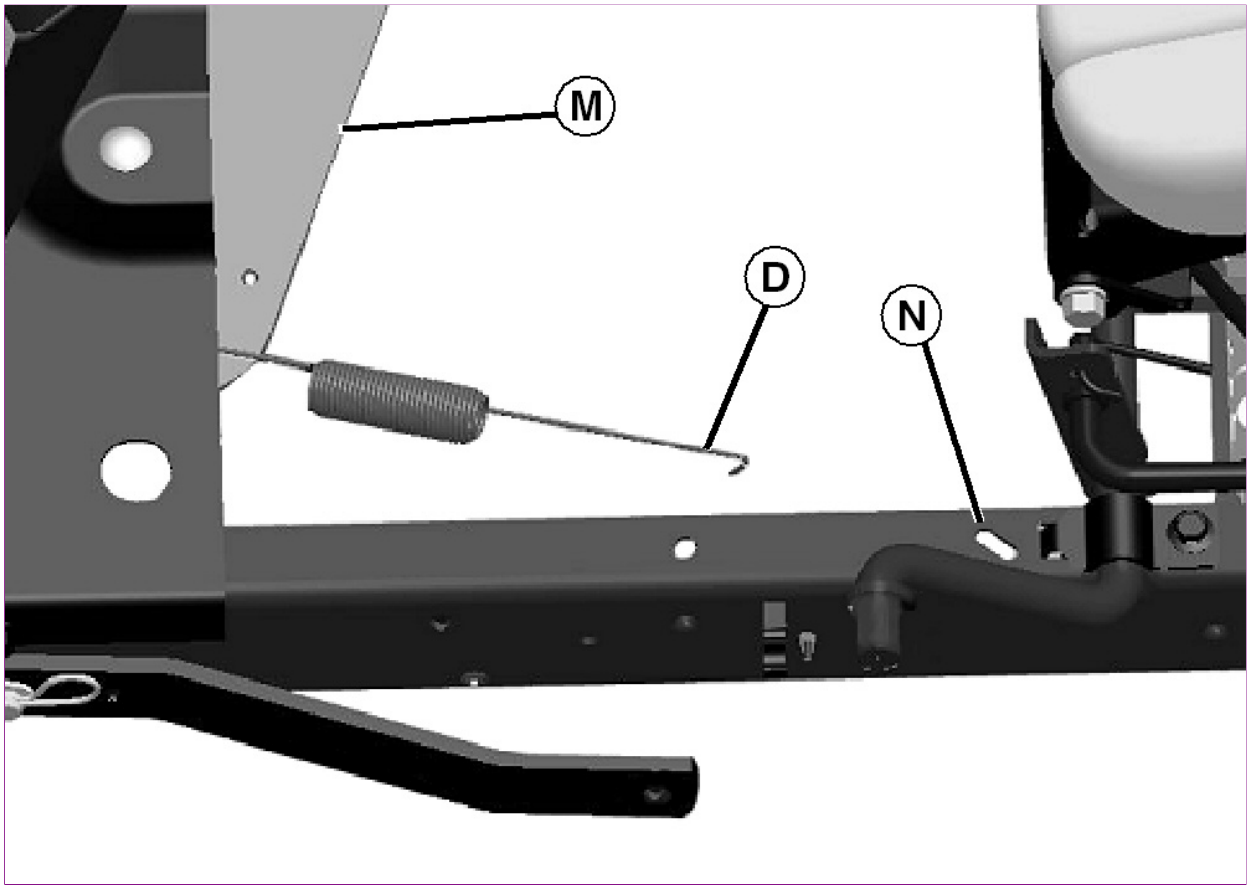
   If only idlers need servicing, remove nuts (G and J) and remove defective idler(s).

   Loosen nut (J) on flat idler (I). Remove belt from around idler and idler guide (F).
6. If idler bracket (M) needs to be removed, release park brake to release tension on spring (D).
7. ***CAUTION:***

   Tensioning spring is under high tension. Wear gloves and use a firm grip when stretching spring.



Remove tensioning spring (D):
- For machines to SN -60000: Disconnect spring end from lift arm shaft (closer to rear of machine).



MXML2008120216471190-19: Machine SN 200001- Shown from top (left side)

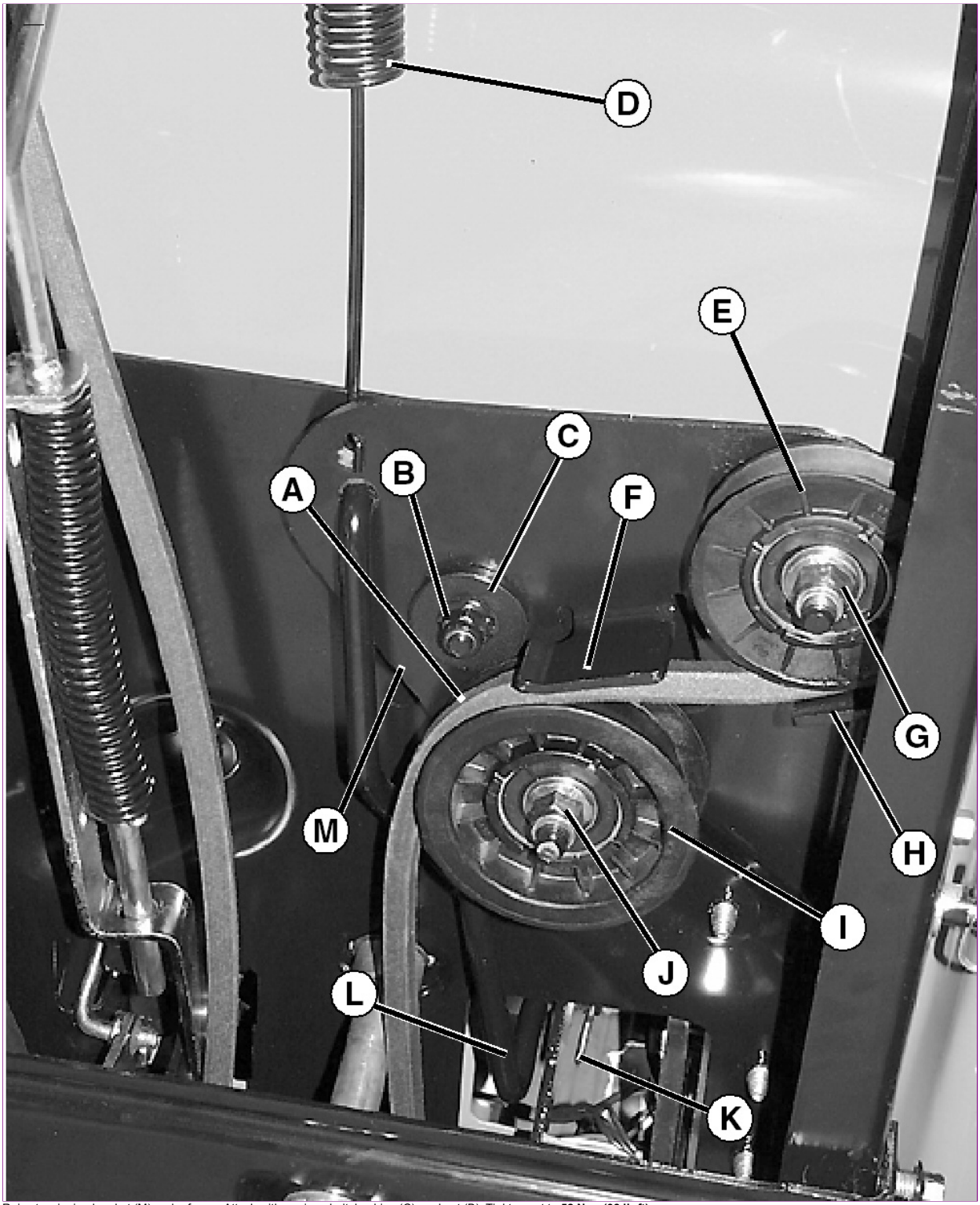
For machines to SN 60001-: Disconnect spring end from slot (N) in frame.

8. Remove spring clip (K) and washer. Remove clutch rod (L) from brake pedal assembly.
9. Remove nut (B) and bushing (C). Lower bracket (M) from machine frame.
10. Inspect all components for wear or damage. Replace, as necessary.

Installation:

1. *NOTE:*

   Be sure spring (D) and clutch rod (L) are attached to tensioning bracket (M) before installing bracket onto frame.



Raise tensioning bracket (M) under frame. Attach with carriage bolt, bushing (C), and nut (B). Tighten nut to **52 N•m (38 lb-ft)** .

2. Install idler rod (L) onto brake pedal assembly. Secure with washer and spring pin (K).
3. Route belt around flat idler (I). Tighten nut (J) for idler.
4. Route belt around V-idler (E). Tighten nut (G) for idler.
5.

CAUTION:

Tensioning spring is under high tension. Wear gloves and use a firm grip when stretching spring.

Making sure parking brake is not engaged, connect tensioning spring (D):

- For machines to SN -60000: Connect spring end to lift arm shaft (closer to rear of machine).
- For machines to SN 60001-: Connect spring end into slot (N) in frame.

6. Test function by engaging and disengaging brake/clutch pedal several times, checking to make sure belt is riding on all sheaves and idlers properly.
7. Install mower deck. See Installing Mower Deck in the Attachments section.

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Transaxle Removal and Installation

Transaxle Removal and Installation

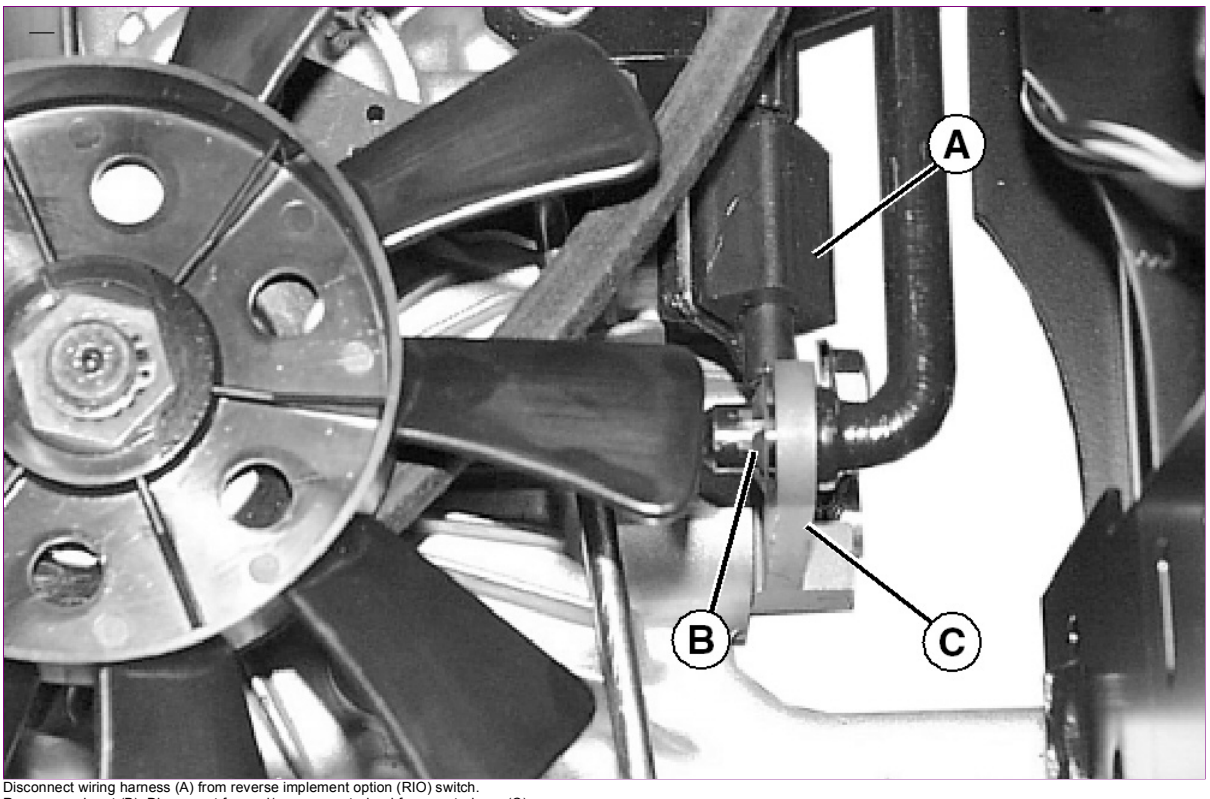
Removal:

1. Park machine on a level surface. Disconnect negative battery cable to prevent accidental starting.
2. Engage park brake to relieve tension on traction drive belt.
3. If attached, remove mower deck. See Attachments section.
4. **IMPORTANT:**

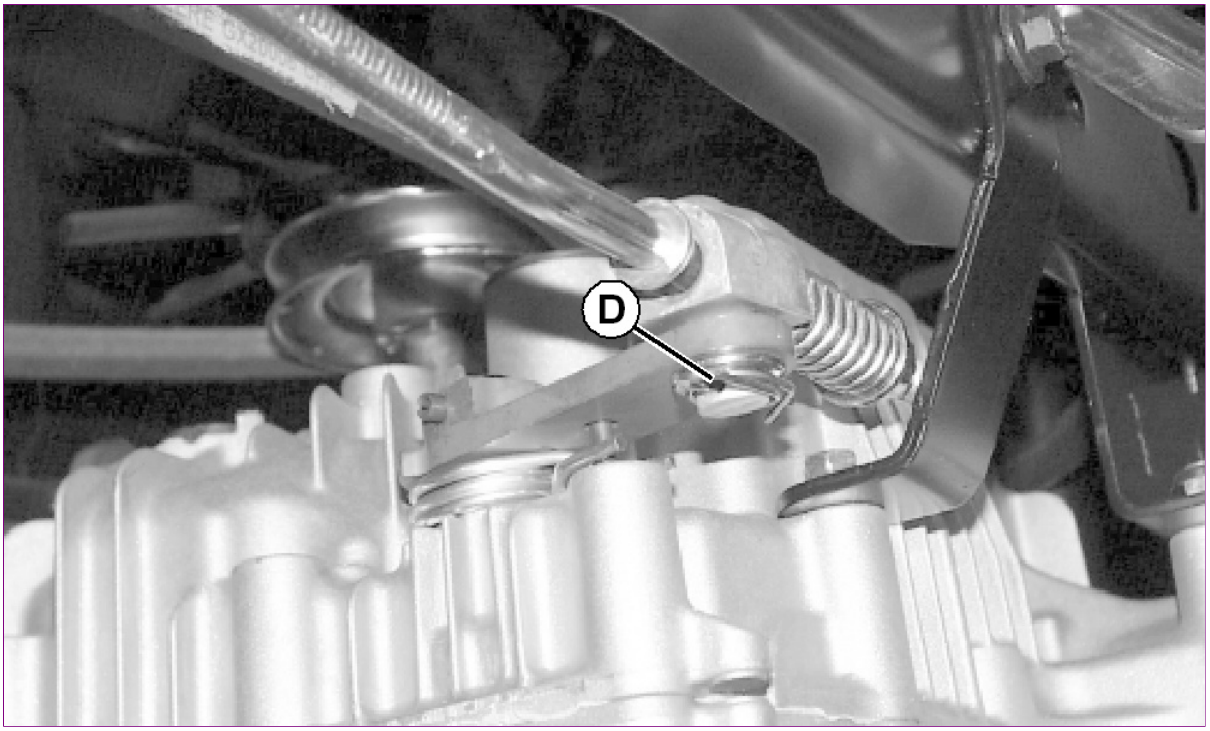
   During transaxle removal, rear of machine must be supported by the frame.

   Raise rear of machine. Support using suitable stands.
5. Remove rear wheels. See Rear Wheel Removal and Installation in the Miscellaneous section.
6. *NOTE:*

   Photos show machine with fenderdeck removed for clarity.

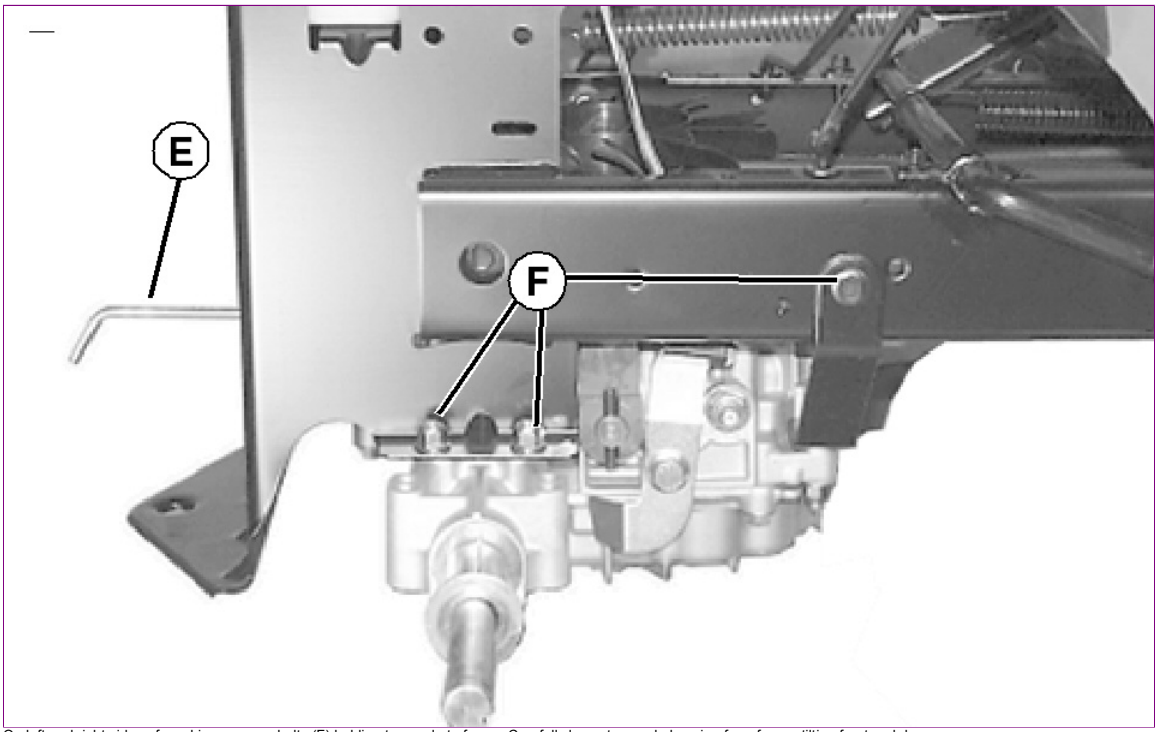


   Disconnect wiring harness (A) from reverse implement option (RIO) switch.
7. Remove push nut (B). Disconnect forward/reverse control rod from control arm (C).



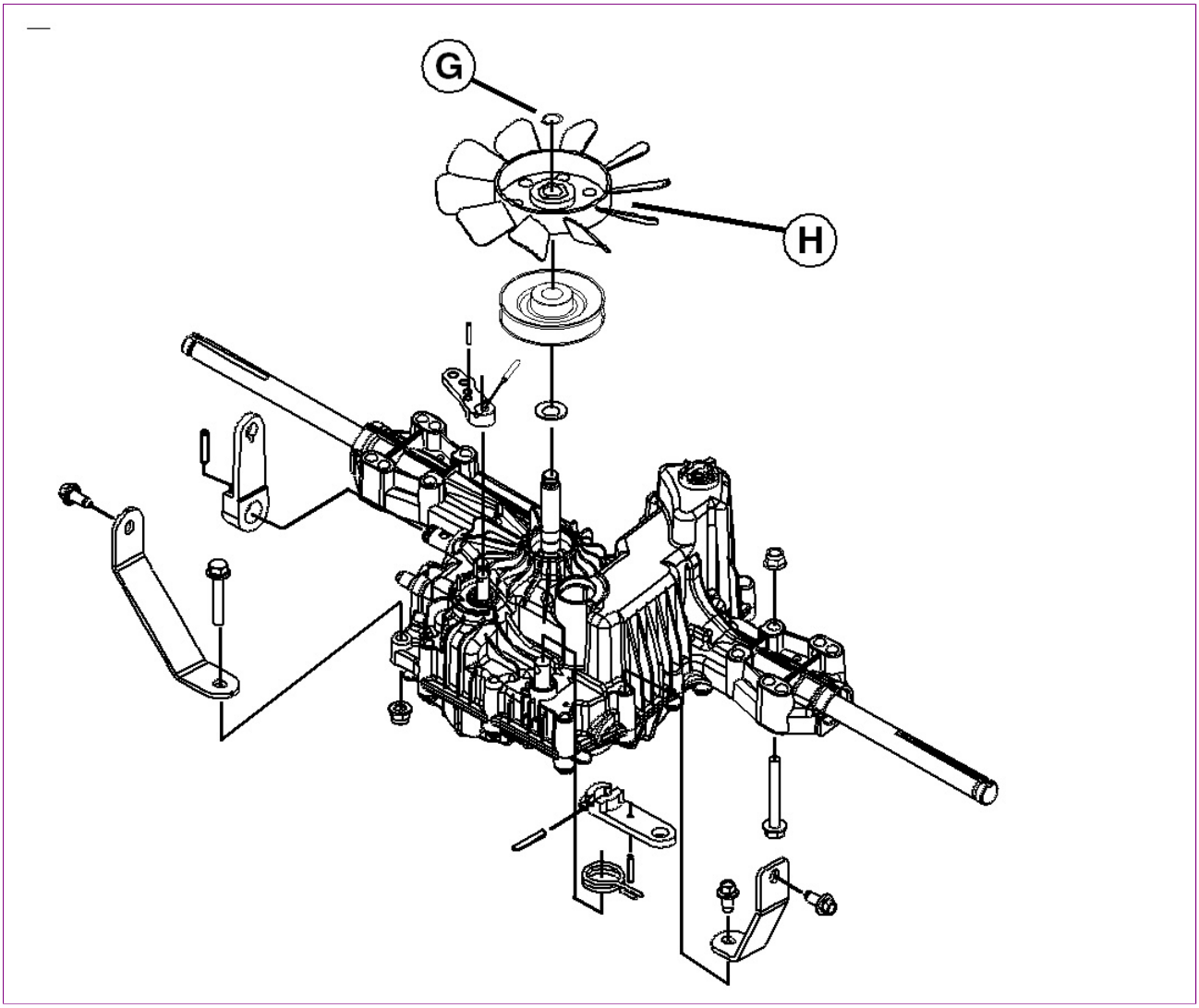
8. Remove spring clip (D) and washer from brake rod pivot end. Raise brake rod to remove from transaxle brake lever.
9. Support transaxle with floor jack.
10. **IMPORTANT:**

    When removing transaxle, tilt the transaxle to remove the freewheel rod from back of machine frame.



On left and right sides of machine, remove bolts (F) holding transaxle to frame. Carefully lower transaxle housing from frame, tilting front end down.

11. Remove drive belt from around sheave and fan.
12. Inspect transaxle control arms and transaxle sheave and fan. Replace as necessary.



13. Remove transaxle fan (H), by removing snap ring (G). Replace parts, as necessary.

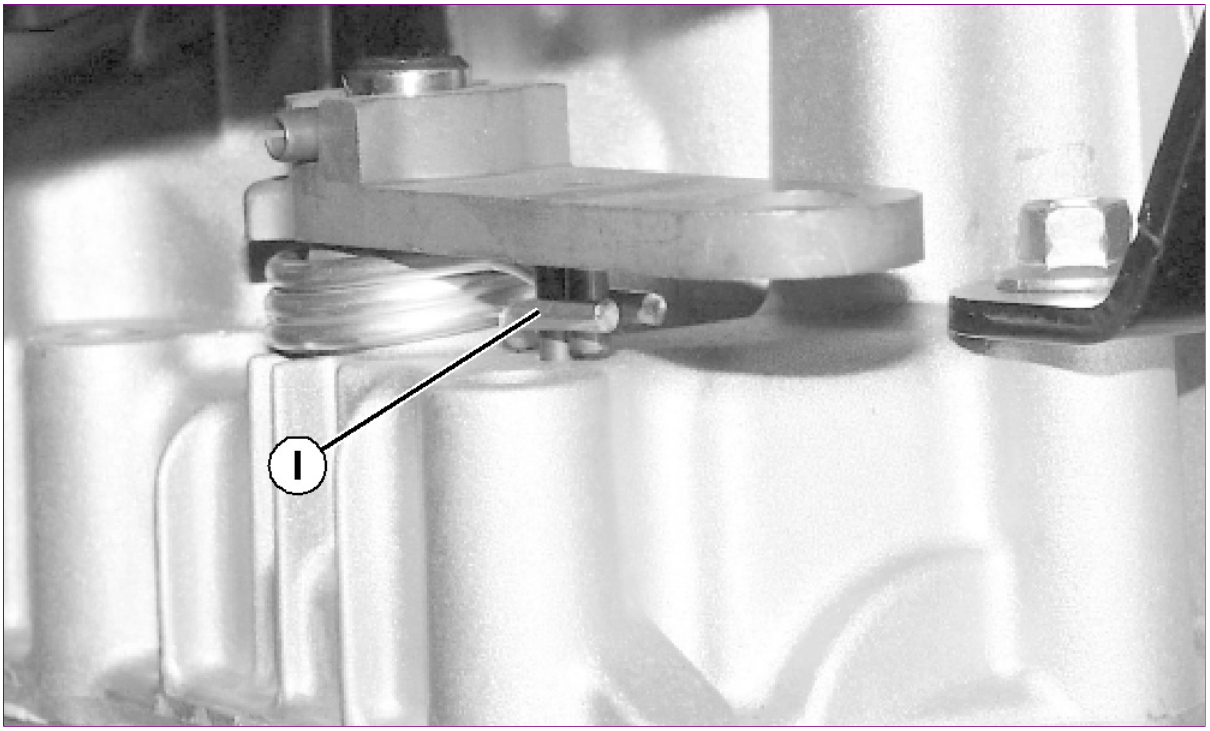
NOTE:

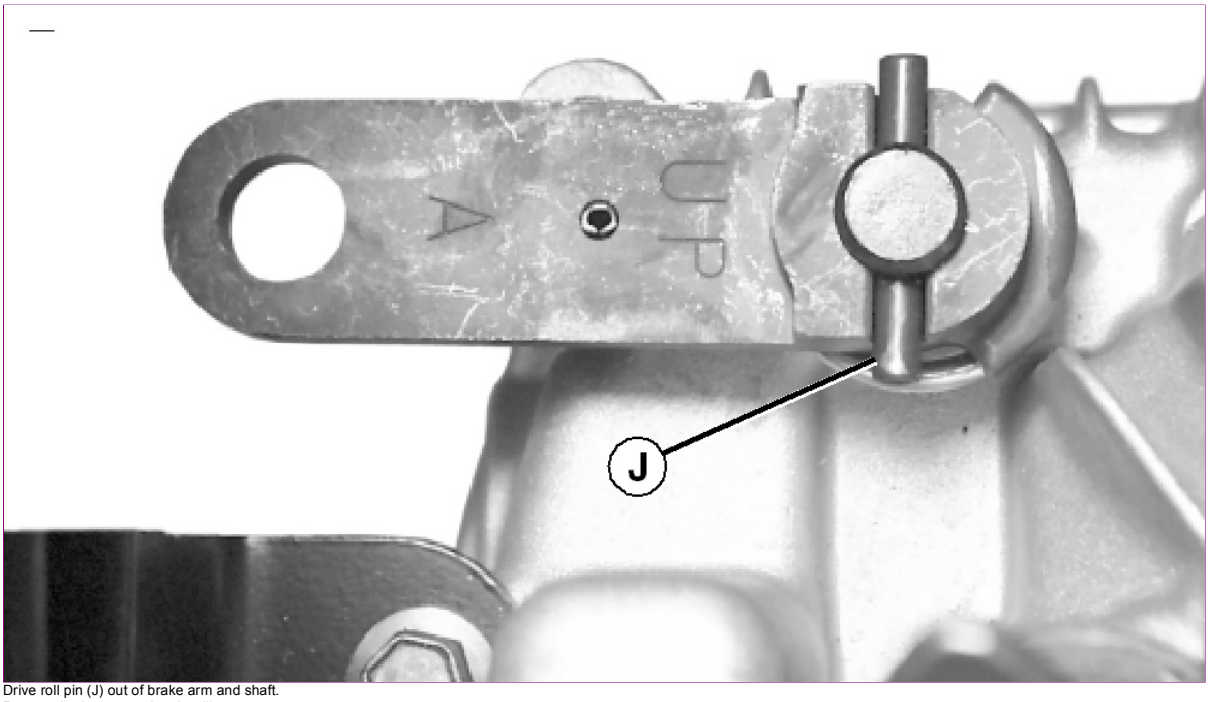
Recall location and orientation of RIO switch bracket when removing and installing, noting that tip of bracket contacts the parting surface of upper housing.

Brake Arm Removal:

1. *NOTE:*

   Observe orientation of return spring (J) before removing brake arm.





Drive roll pin (J) out of brake arm and shaft.

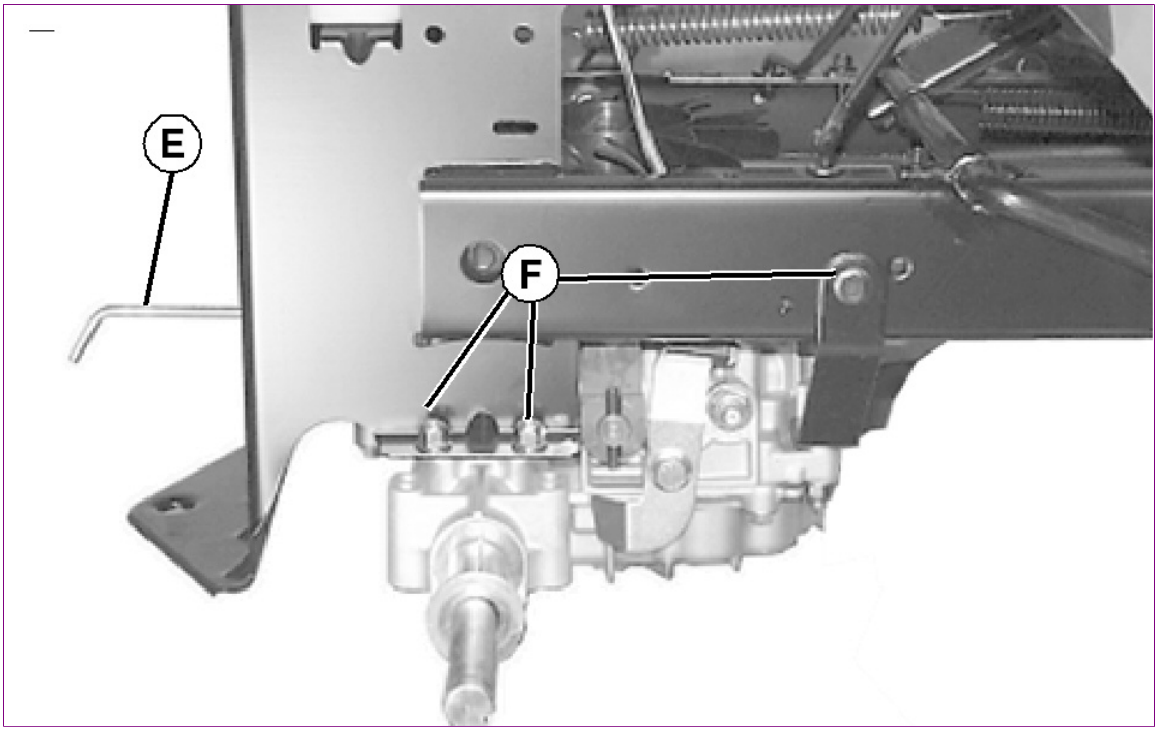
2. Remove brake arm and spring (I).

Installation:

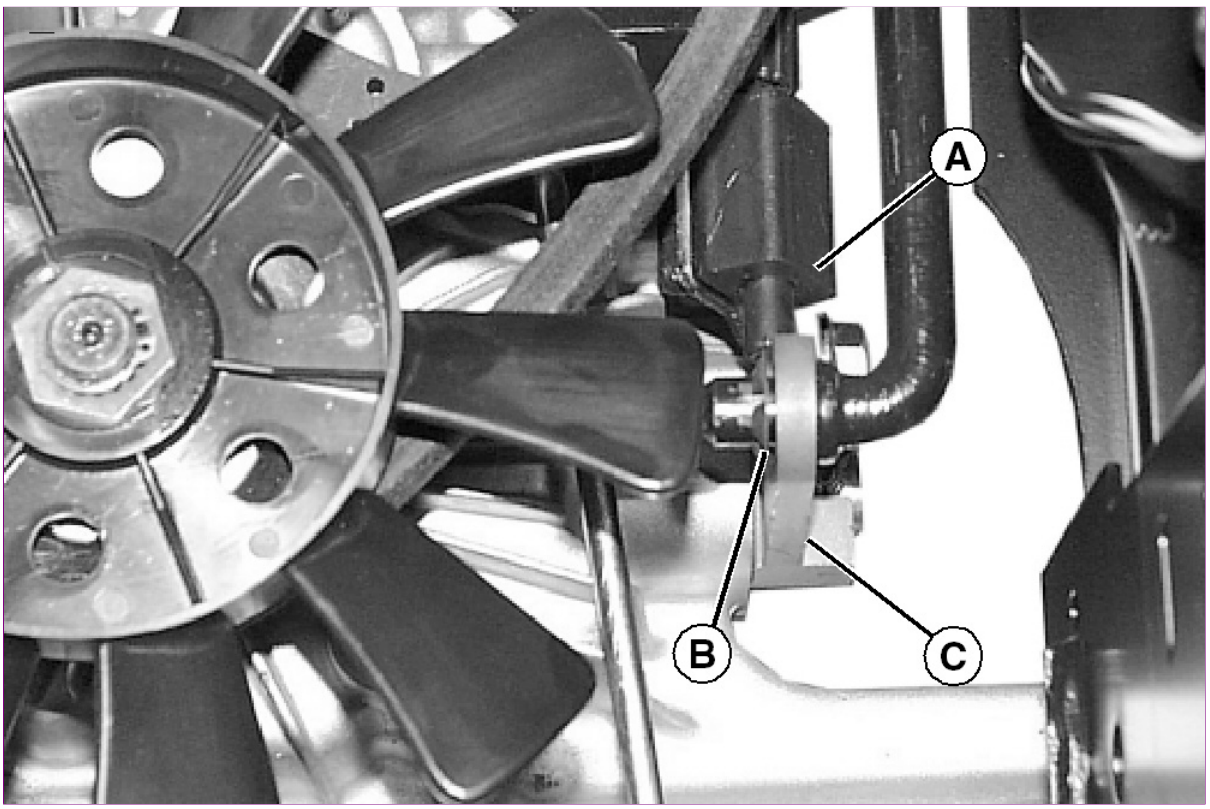
1. **IMPORTANT:**

   When installing transaxle, align the freewheel rod through back of machine frame.

   Raise transaxle up to frame.

2. 

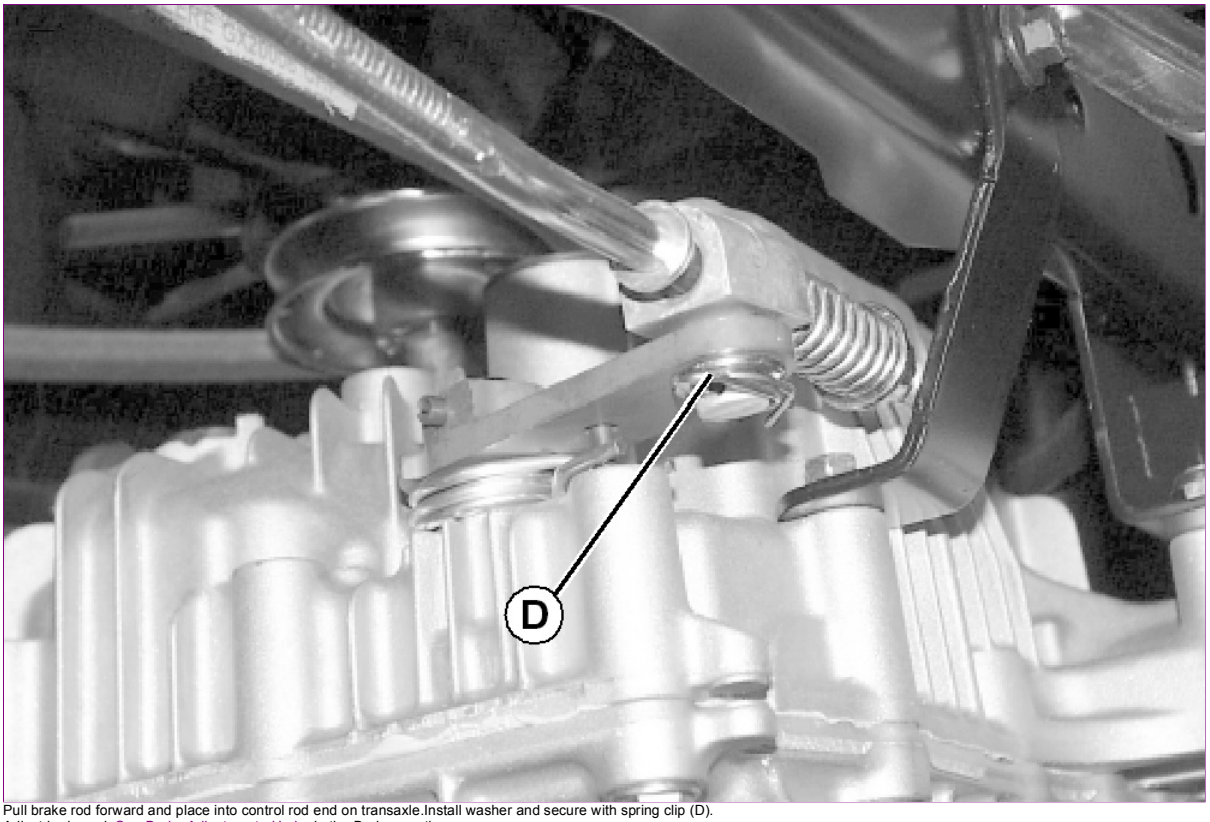
On right and left sides of machine, install bolts (F) securing transaxle to frame. Do not tighten bolts at this time.

3. 

Install forward/reverse control rod to control arm (C) on transaxle, and secure with push nut (B).

4. Connect RIO switch (A) wiring harness at connection.
5. Install belt guide and secure guide with screw (A).
6. Tighten transaxle mounting bolts to **40 N•m (30 lb-ft)** .
7. Install bolt (H) through bracket and frame.
8. *NOTE:*

   When putting brake rod back onto transaxle control arm, it will be necessary to adjust brake rod.



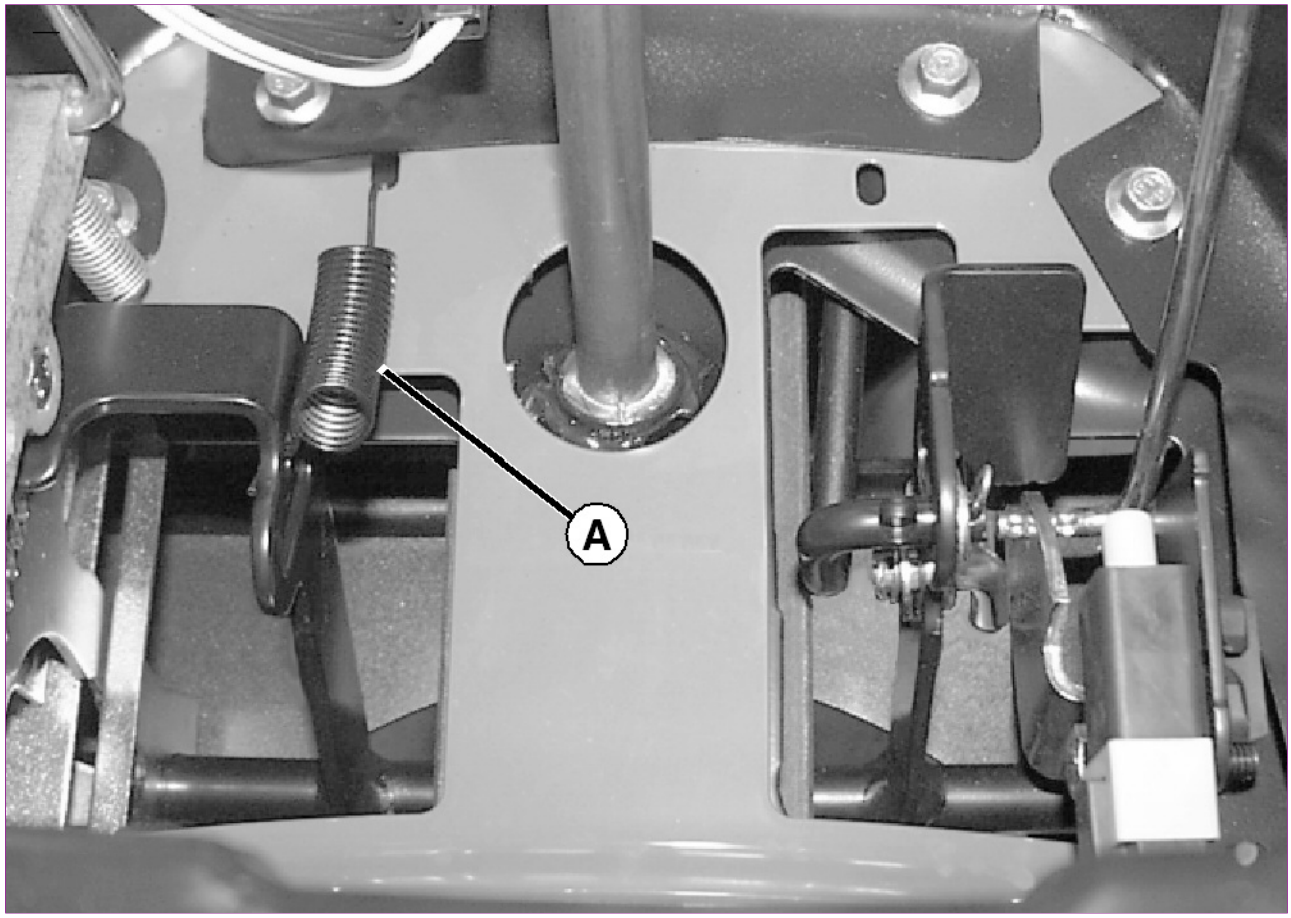
Pull brake rod forward and place into control rod end on transaxle.Install washer and secure with spring clip (D).

9. Adjust brake rod. See Brake Adjustment - Hydro in the Brakes section.
10. Install rear wheels. See Rear Wheel Removal and Installation in the Miscellaneous section.
11. Lower machine and install mower deck. See Attachments section.

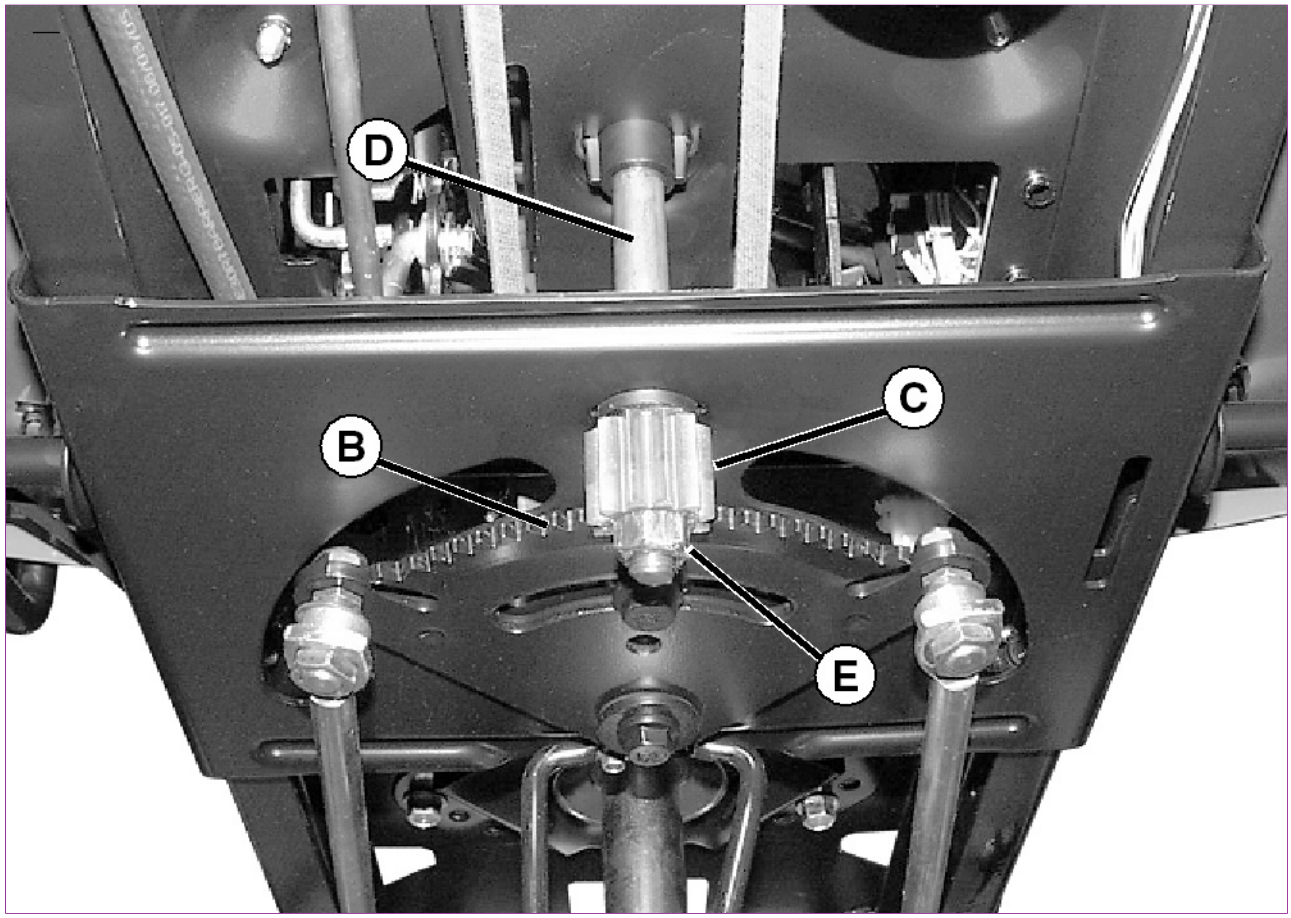
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Control Pedal Removal and Installation

Control Pedal Removal and Installation

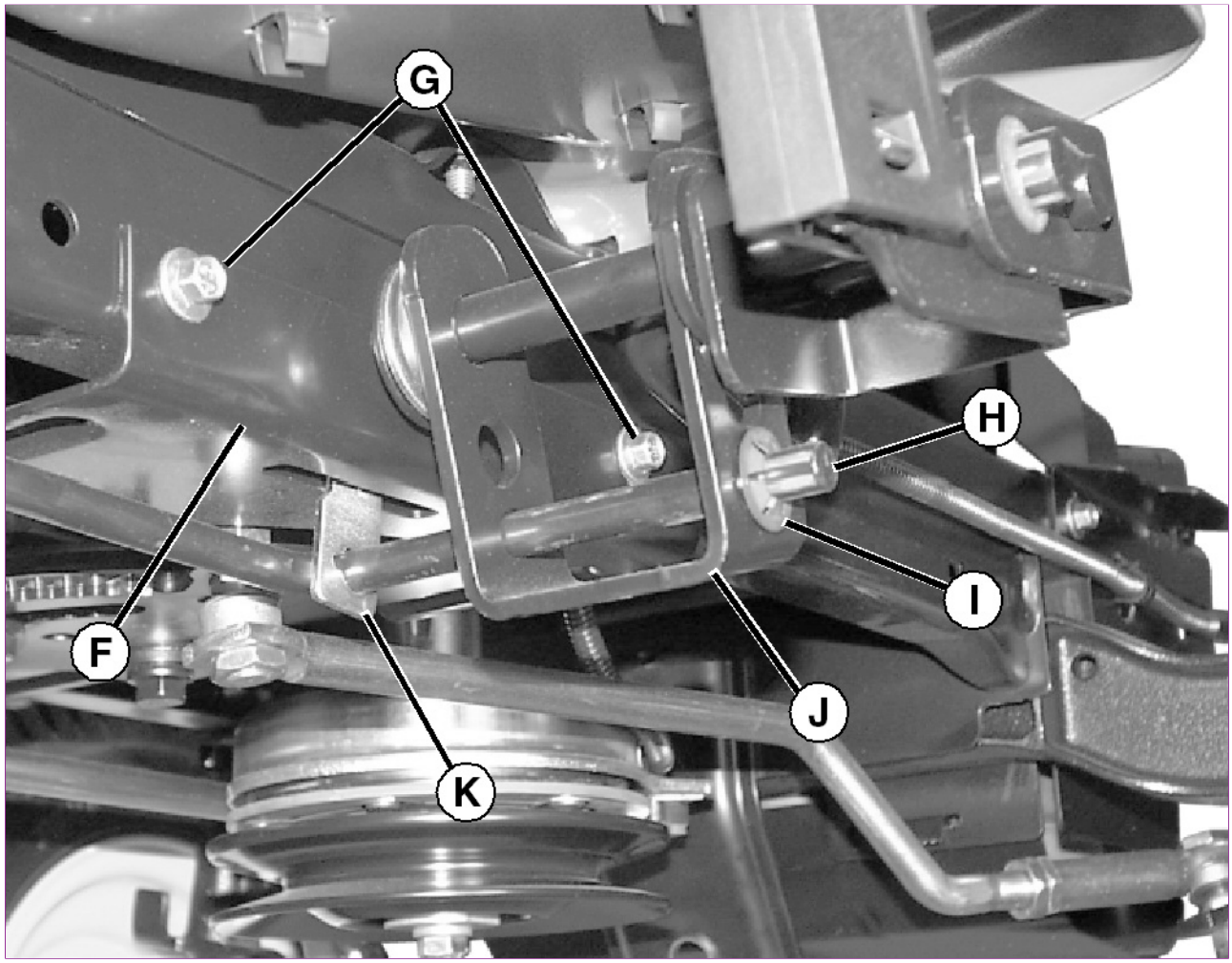
Removal:

1. Park machine on level surface.
2. Disconnect negative (-) battery cable.
3. Remove mower deck. See Removing Mower Deck in the Attachments section.
4. Remove battery and battery bracket.
5. 

Remove spring (A) from fender deck and brake pedal assembly.

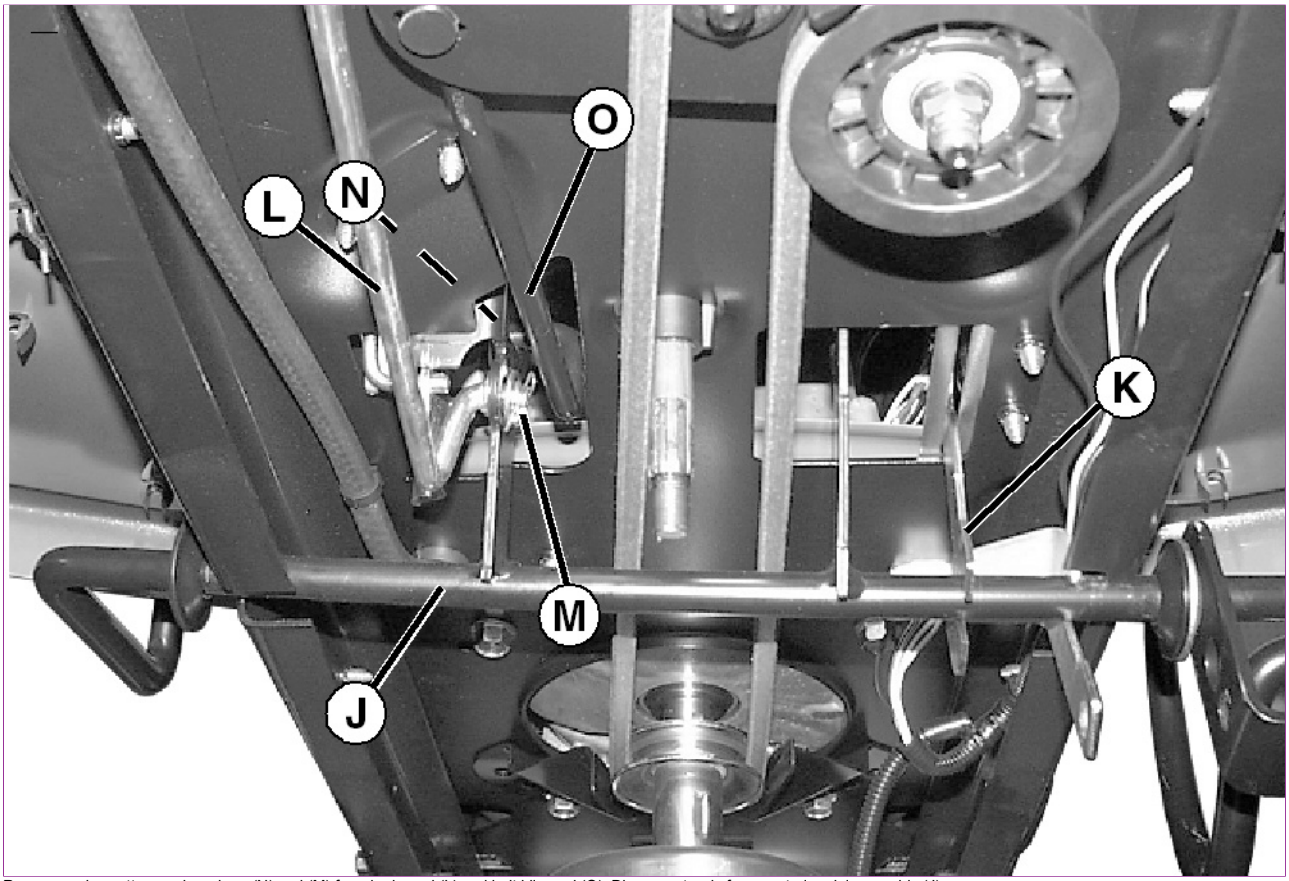
6. 

   Remove nut (E) and pinion gear (C).
7. Raise steering control rod (D) just enough to clear sector gear (B).



8. Remove push nut (I) from forward/reverse rod (H). Remove rod from control pedal assembly (J) and cruise control bracket (K).
9. Remove screws (G) from bracket (F) on both sides of machine and lower bracket from machine.
10. *NOTE:*

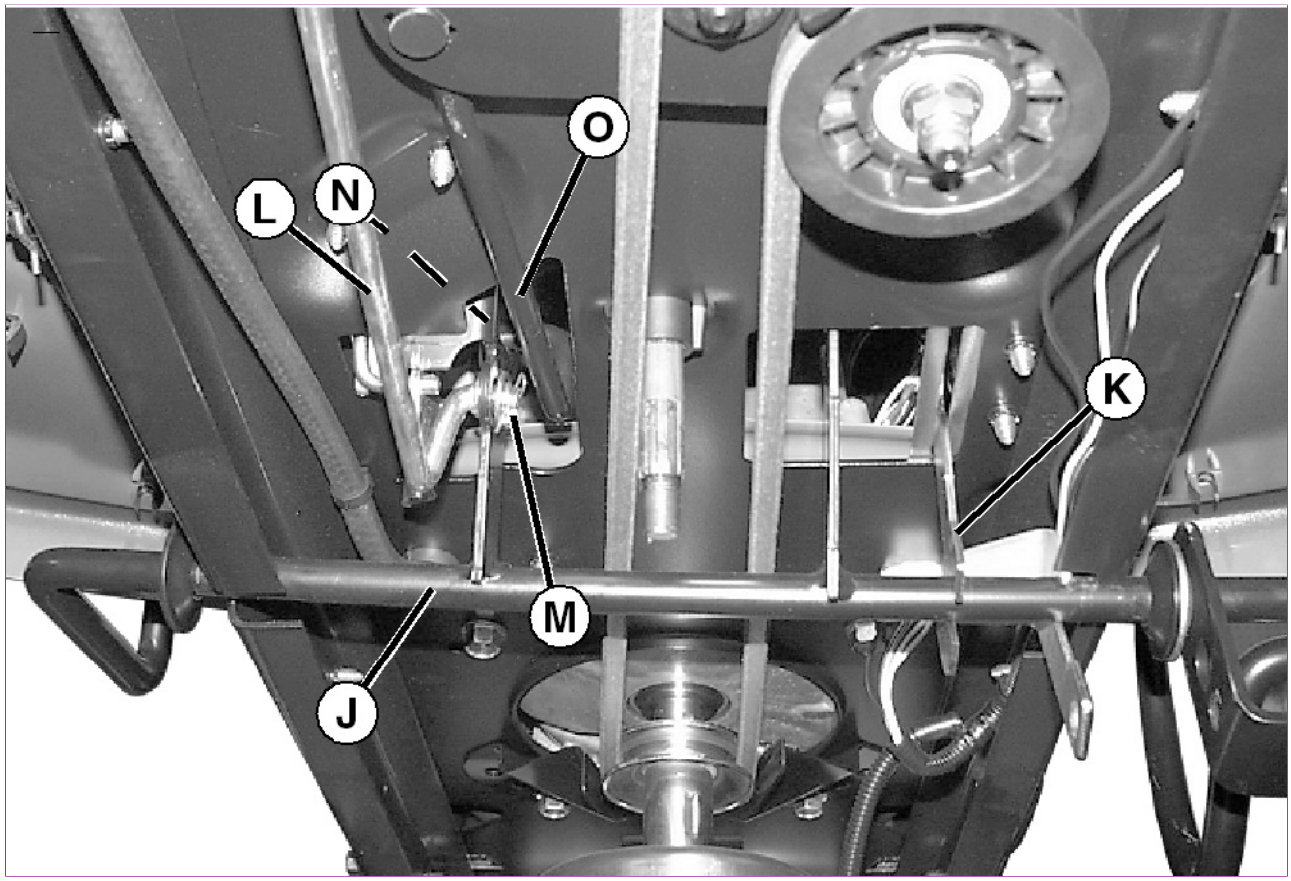
    Be careful when lowering plate (F). Note location for hardware and linkage for forward/reverse pedal assembly during this procedure.



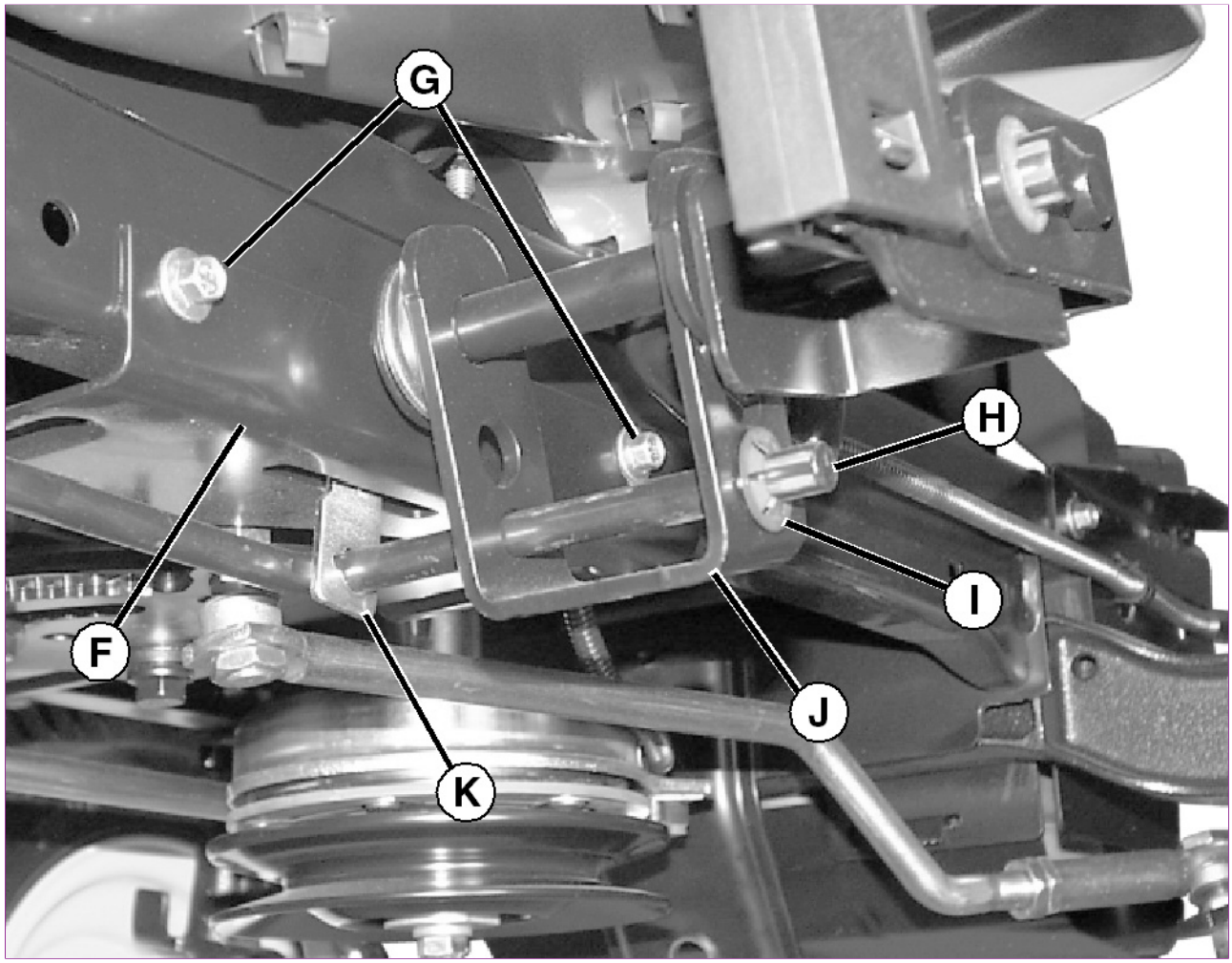
Remove spring cotters and washers (N) and (M) from brake rod (L) and belt idler rod (O). Disconnect rods from control pedal assembly (J).

11. Lower pedal assembly (J), and cruise control bracket (K) down and out of machine.
12. Inspect rod and pedals for damage. Replace as necessary.

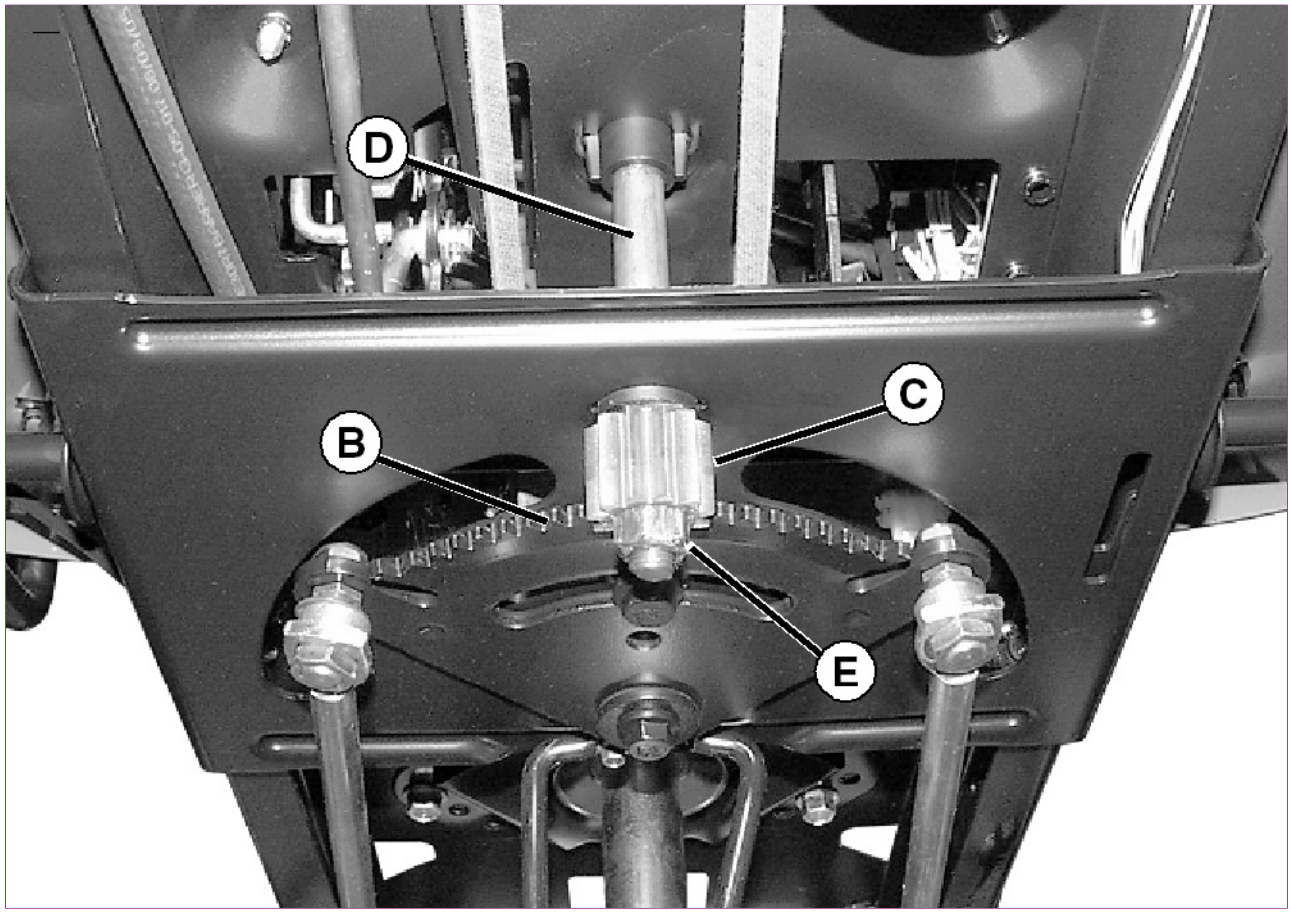
Installation:



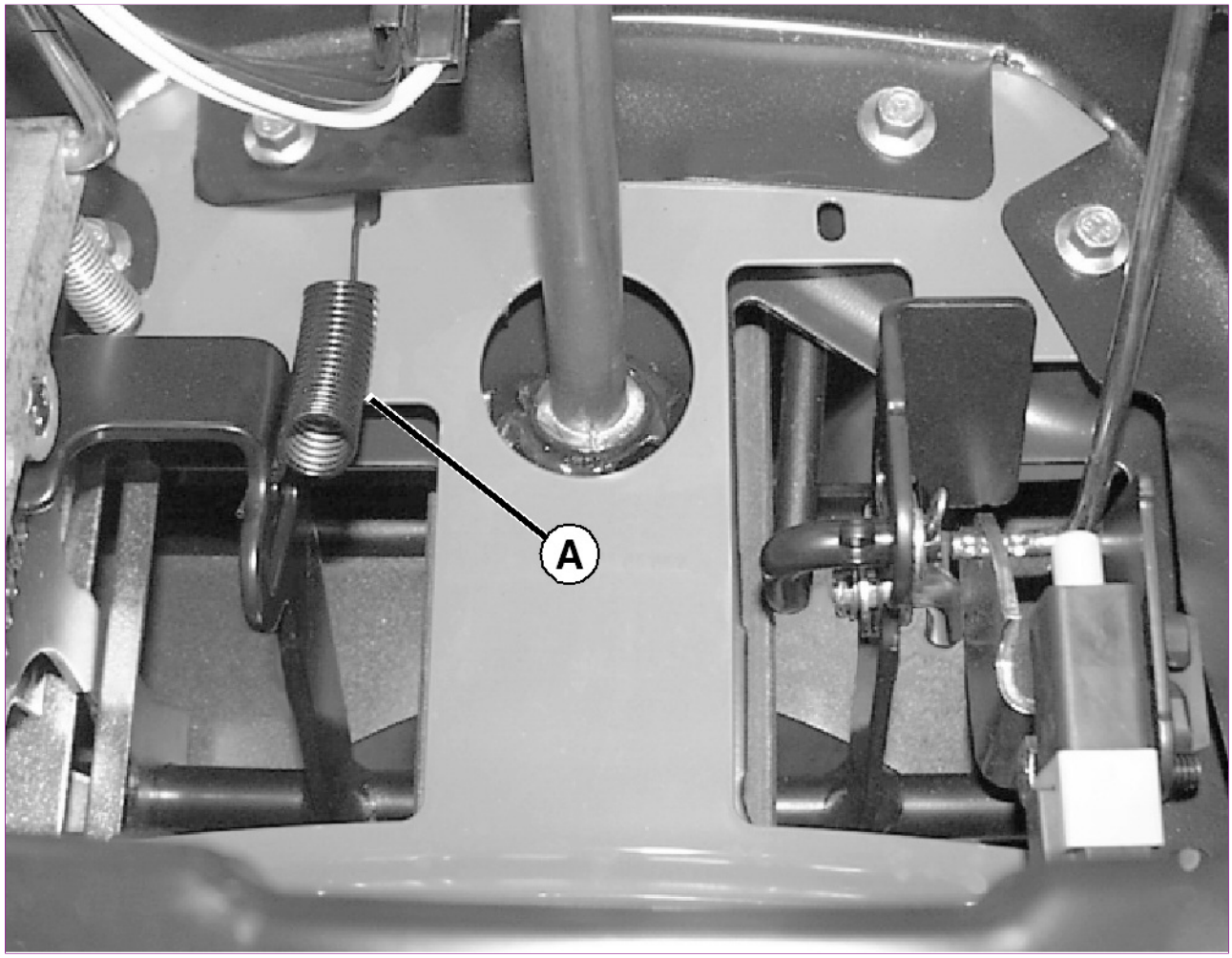
1. Place pedal assembly (J) and cruise control bracket up into the slots in machine frame.
2. Attach brake rod (L) and belt idler rod (O) to control pedal assembly (J). Secure with washers and spring cotters.



3. Raise control and bracket (F) up to frame, being careful to also raise cruise control bracket (K) along with pedal assembly, onto steering shaft (D).Install screws (G) through bracket (F) and onto frame on both sides of machine.
4. Install forward/reverse rod (H) through cruise control bracket (K) and onto pedal assembly (J). Secure with push nut (I).

5. 

With wheels centered, lower steering control rod (D) through sector gear (B).
6. Install pinion gear (C) and lower steering rod (D) onto pinion gear. Secure with nut (E).



7. Install spring (A) onto fender deck and brake pedal assembly.
8. Install battery bracket and battery.
9. Install mower deck. See Installing Mower Deck in the Attachments section.
10. Connect battery.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
General Specifications

General Specifications

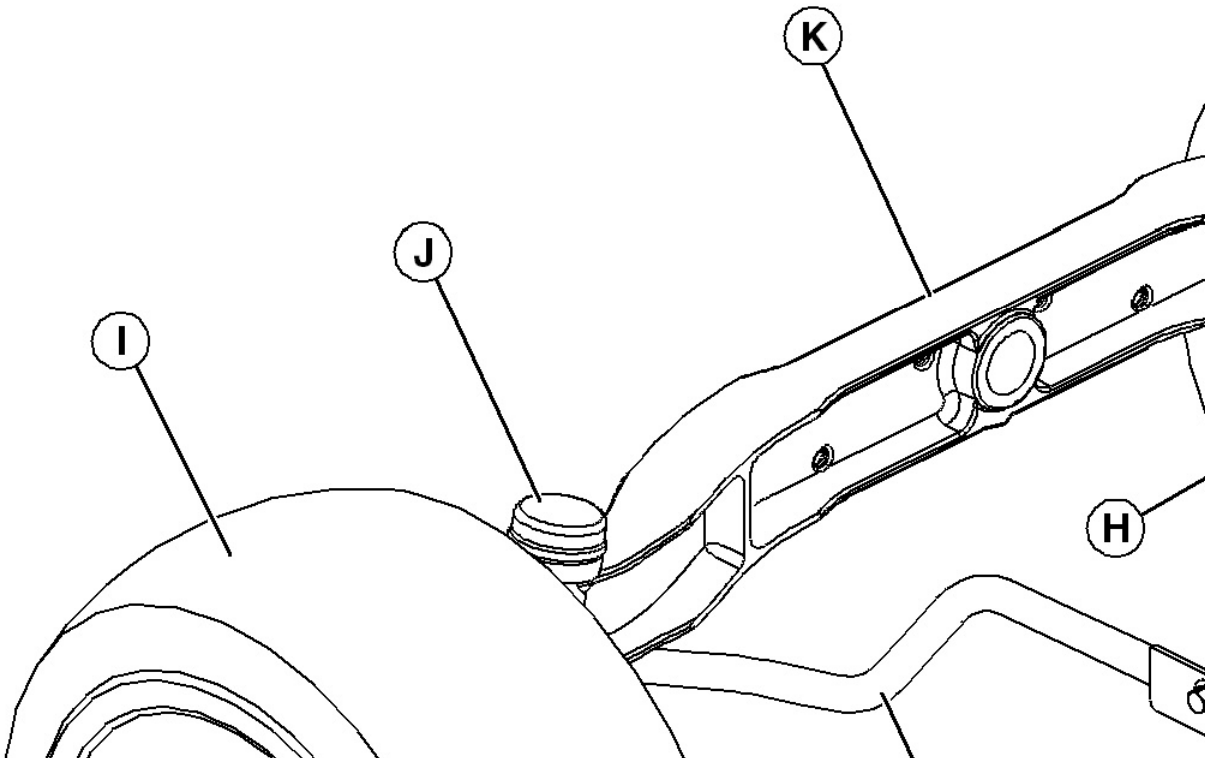
Item	Measurement	Specification
Steering		
Type		Sector and Pinion
Toe-In (Acceptable)		40 ± 20 mm 1.5 ± 0.75 in.)
Toe-In (Target)		40 - 60 mm 1.5 - 2.25 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Torque Specifications

Torque Specifications

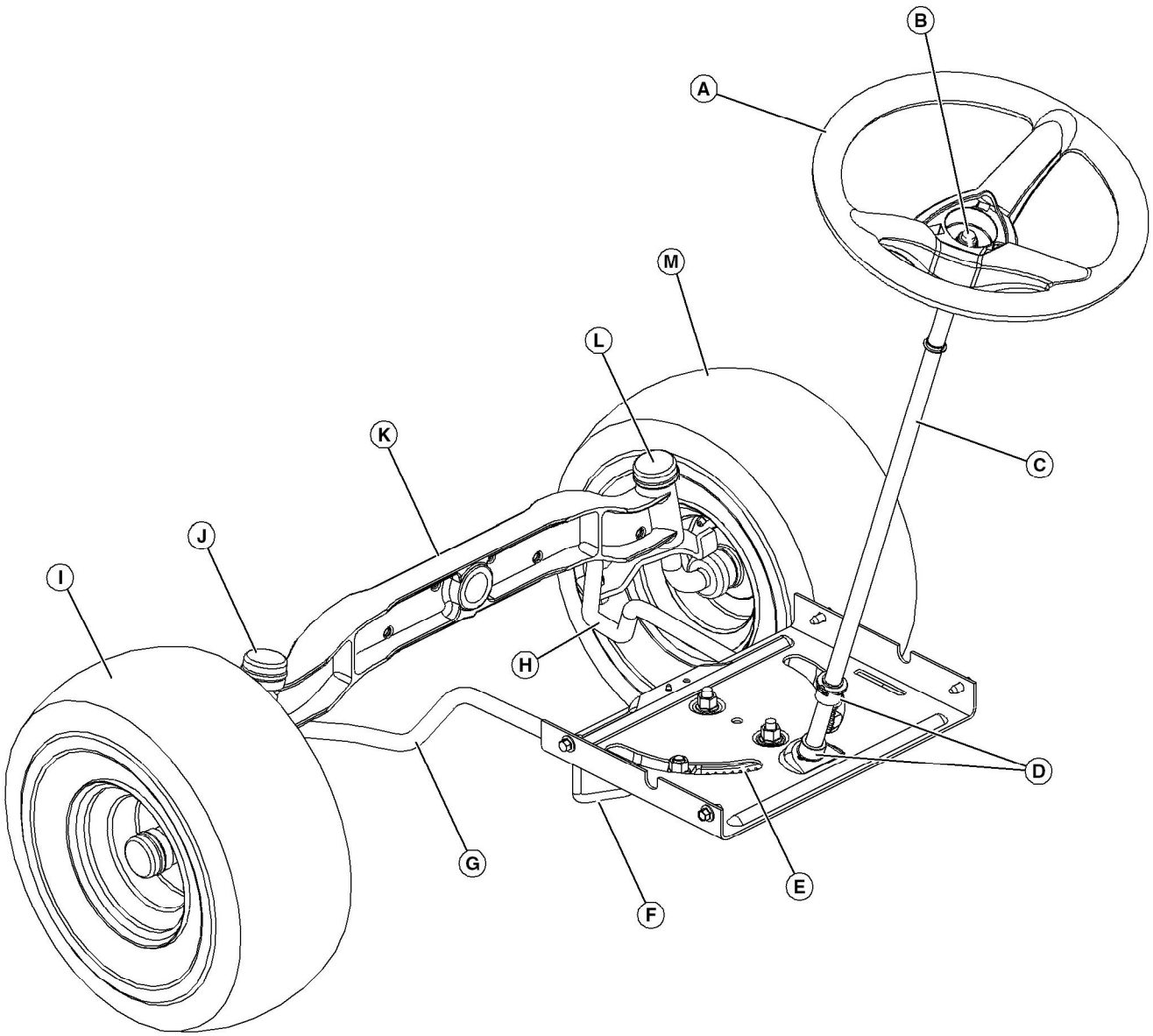
Item	Measurement	Specification
Specifications:		
Front Axle Pivot		122 N•m 90 lb-ft)
Muffler to Front Frame		16 N•m 12 lb-ft)

Steering System Components

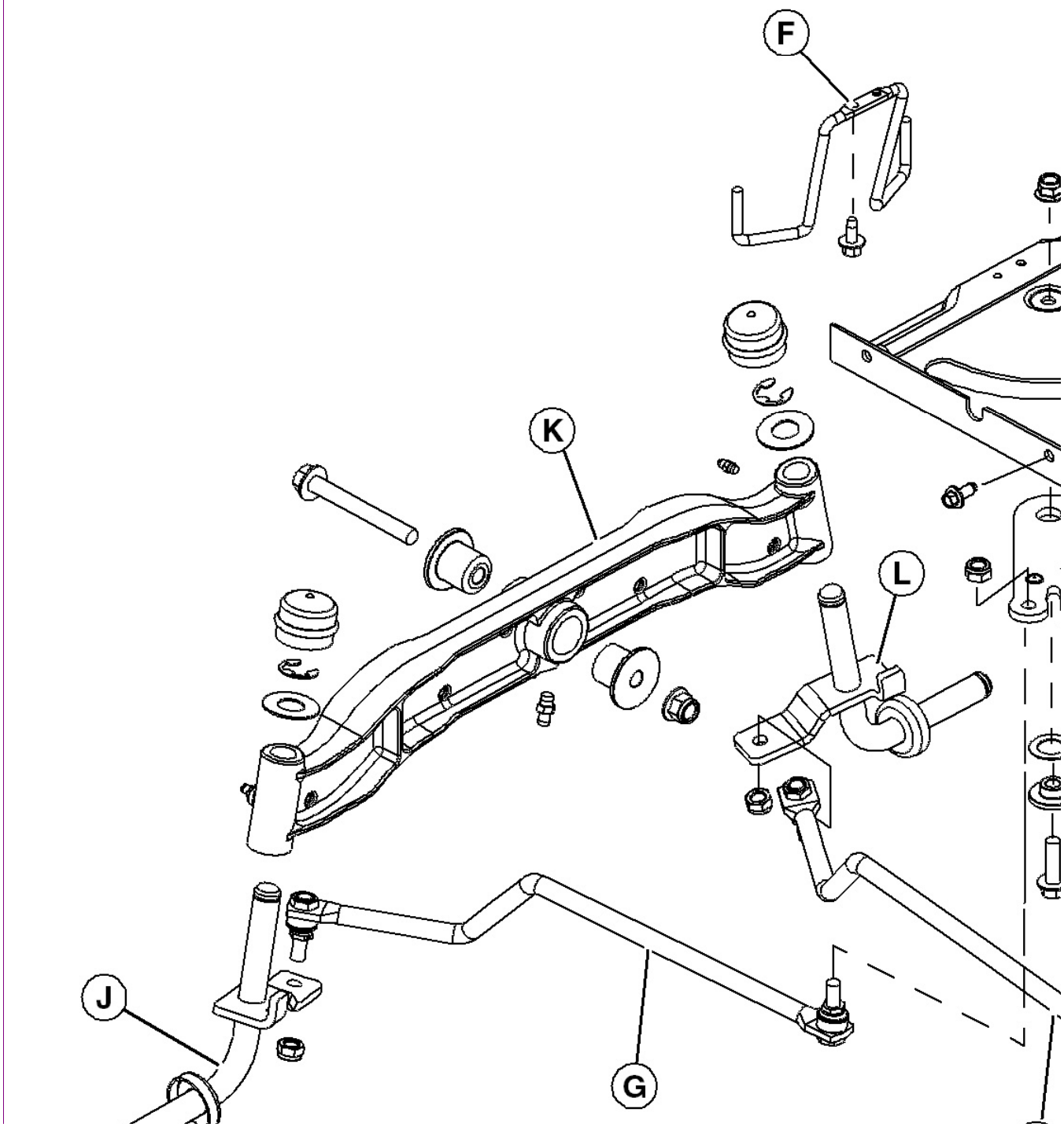

K
J
I
H

LEGEND:

A - Steering Wheel
B - Fastening Hardware
C - Steering Shaft
D - Lower Bushings
E - Sector Gear
F - Belt Guide (LA105/115/125/135 Models Only)
G - Left Drag Link
H - Right Drag Link
I - Left Wheel
J - Left Spindle
K - Beam Axle Assembly
L - Right Spindle
M - Right Wheel

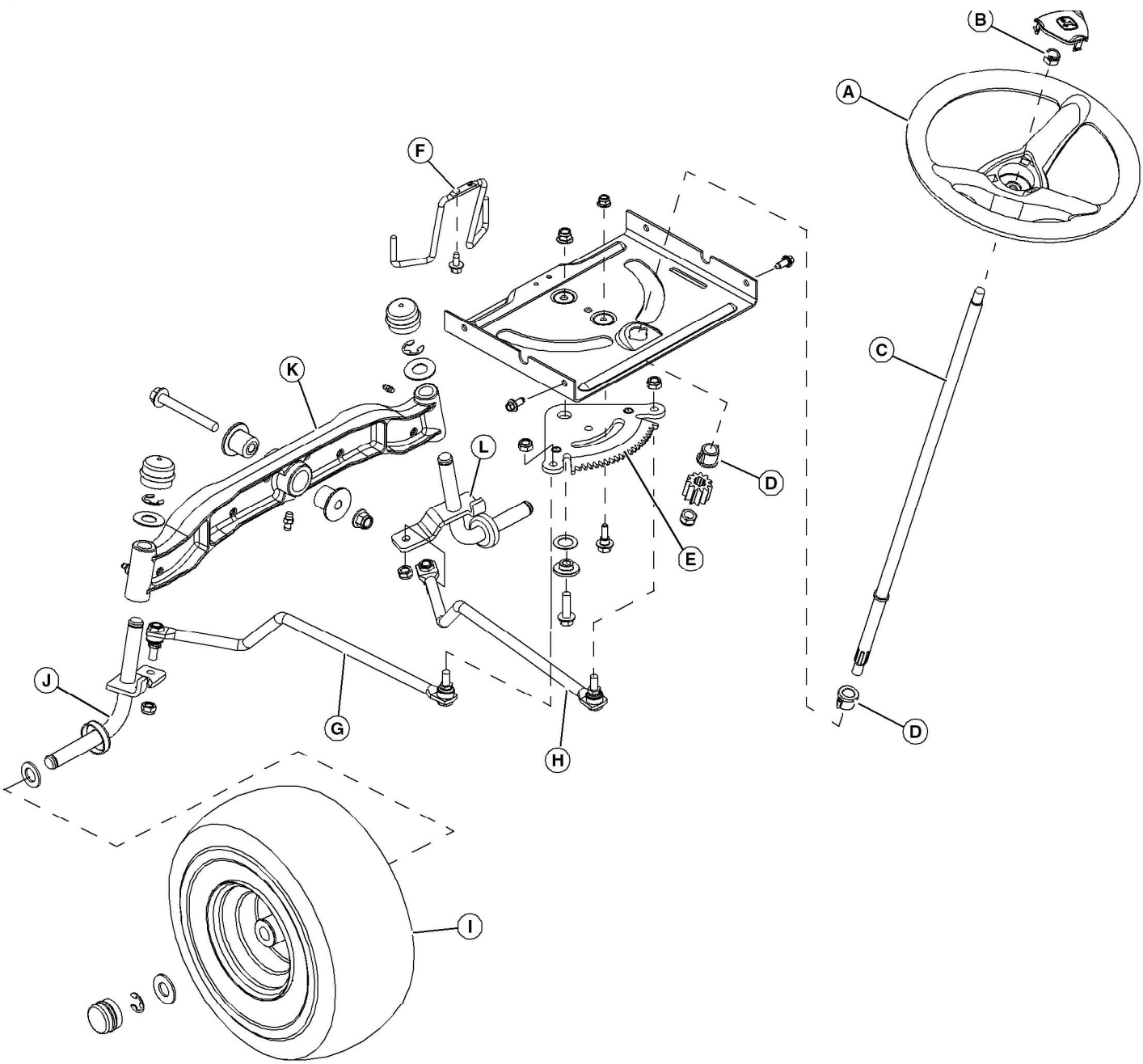

A
B
C
D
E
F
G
H
I
J
K
L
M

Steering System Components - Explode


F
K
L
J
G

LEGEND:

A - Steering Wheel
B - Fastening Hardware
C - Steering Shaft
D - Lower Bushings
E - Sector Gear
F - Belt Guide (LA105/115/125/135 Models Only)
G - Left Drag Link
H - Right Drag Link
I - Left Wheel
J - Left Spindle
K - Beam Axle Assembly
L - Right Spindle


B
A
F
C
K
L
D
E
J
G
H
D
I

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Toe-In Adjustment

Toe-In Adjustment

Purpose:

Correct excessive front wheel toe-in.

Procedure:

1. Park machine safely.
2. Measure the distance from the floor to the center of the wheel hub on one of the front tires.
3. Use the measurement and mark the center rib on the front and rear of each front tire at that distance from the floor.
4. Push the front of the tires outward.
5. Measure the distance between the marks on the front of the tires. Measure the distance between the marks on the rear of the tires.
6. Subtract the front measurement from the rear measurement. Record this number.
7. Push the front of the tires inward (together).
8. Measure the distance between the marks on the front of the tires. Measure the distance between the marks on the rear of the tires.
9. Subtract the front measurement from the rear measurement. Record this number.
10. Add the two recorded measurements. This is the amount of toe-in.

Results:

- If the toe-in is within specification, toe-in is correct.
- *NOTE:*

  Adjustable tie rods can be ordered as replacements.

  If the toe-in is out of specification, replace the tie-rods.

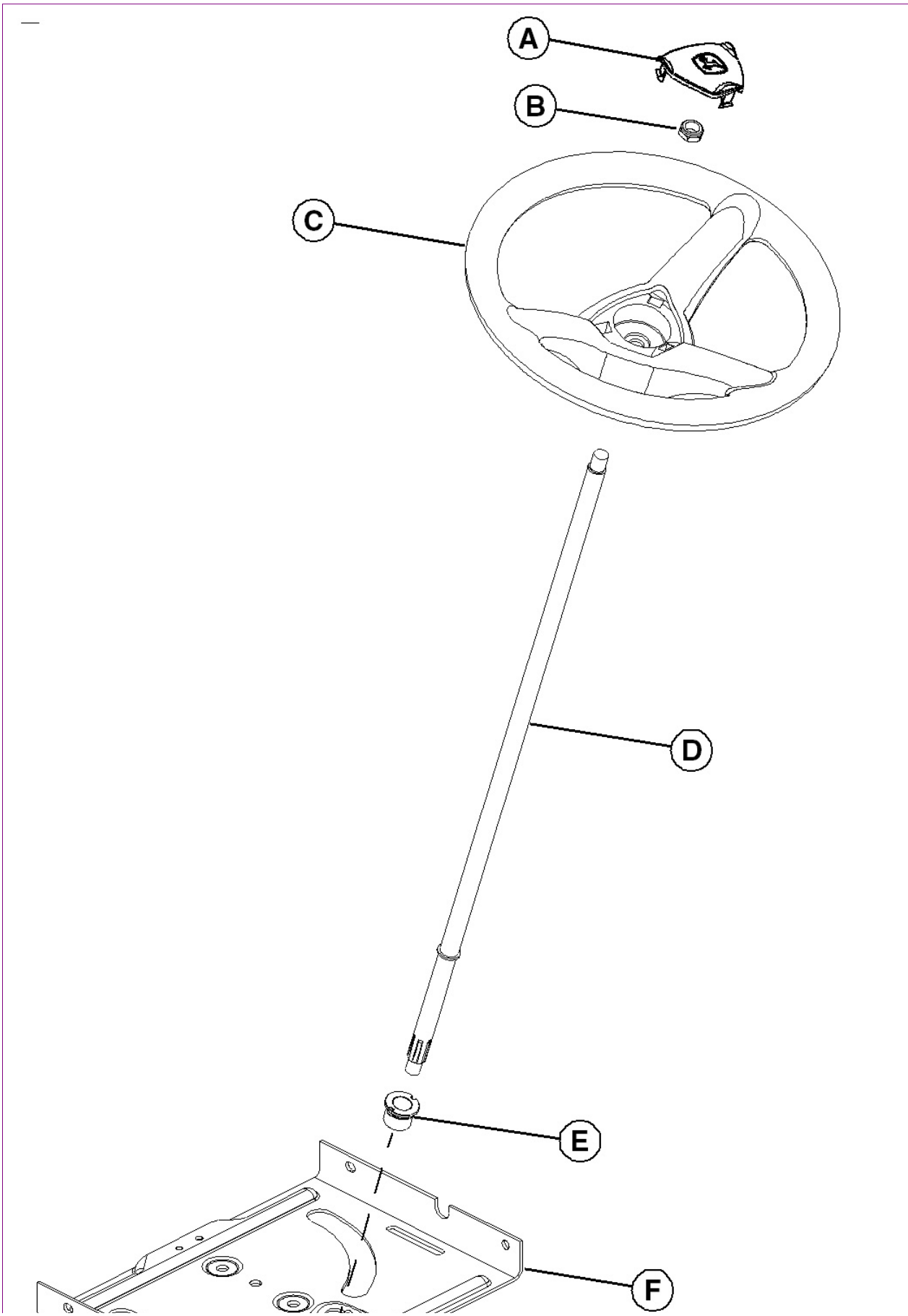
Item	Measurement	Specification
Specifications:		
Toe-In (Acceptable)		40 ± 20 mm 1.5 ± 0.75 in.)
Toe-In (Target)		40 - 60 mm 1.5 - 2.25 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Steering Shaft and Pedestal Removal and Installation

Steering Shaft and Pedestal Removal and Installation

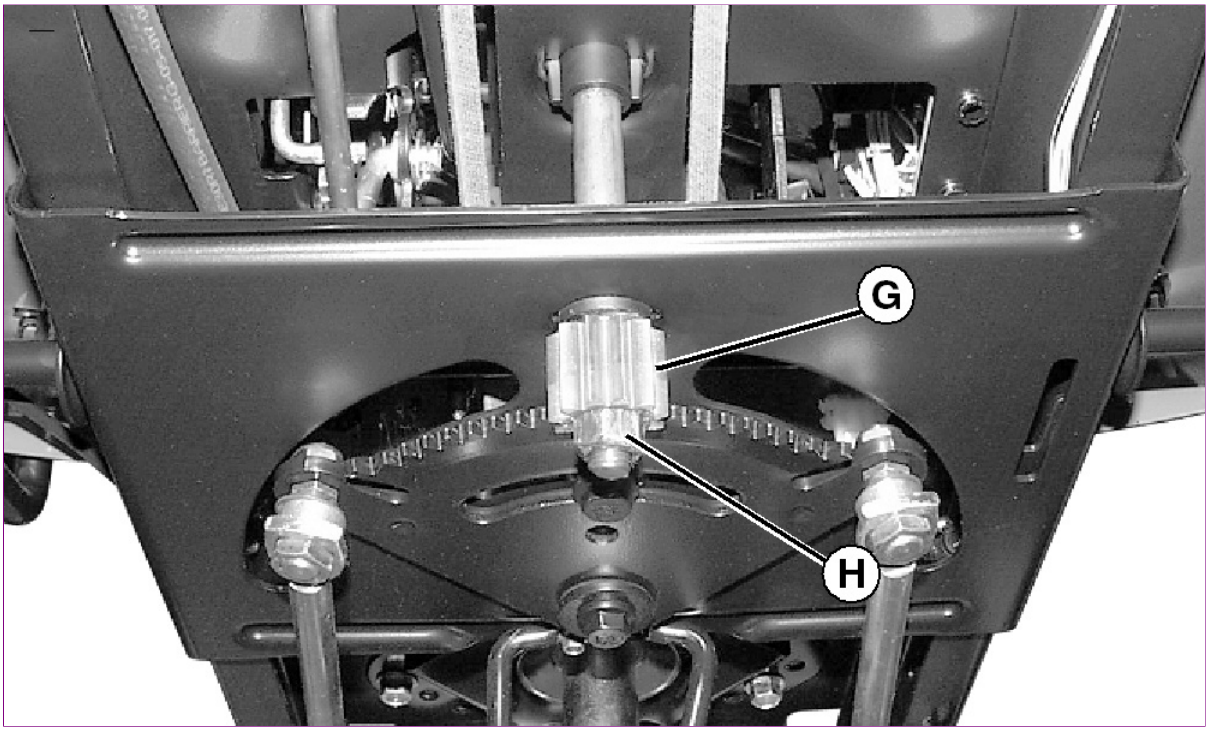
Removal:

1. Remove mower deck. See Removing Mower Deck in the Attachments section.
2. Safely raise front and back wheels to a working height.

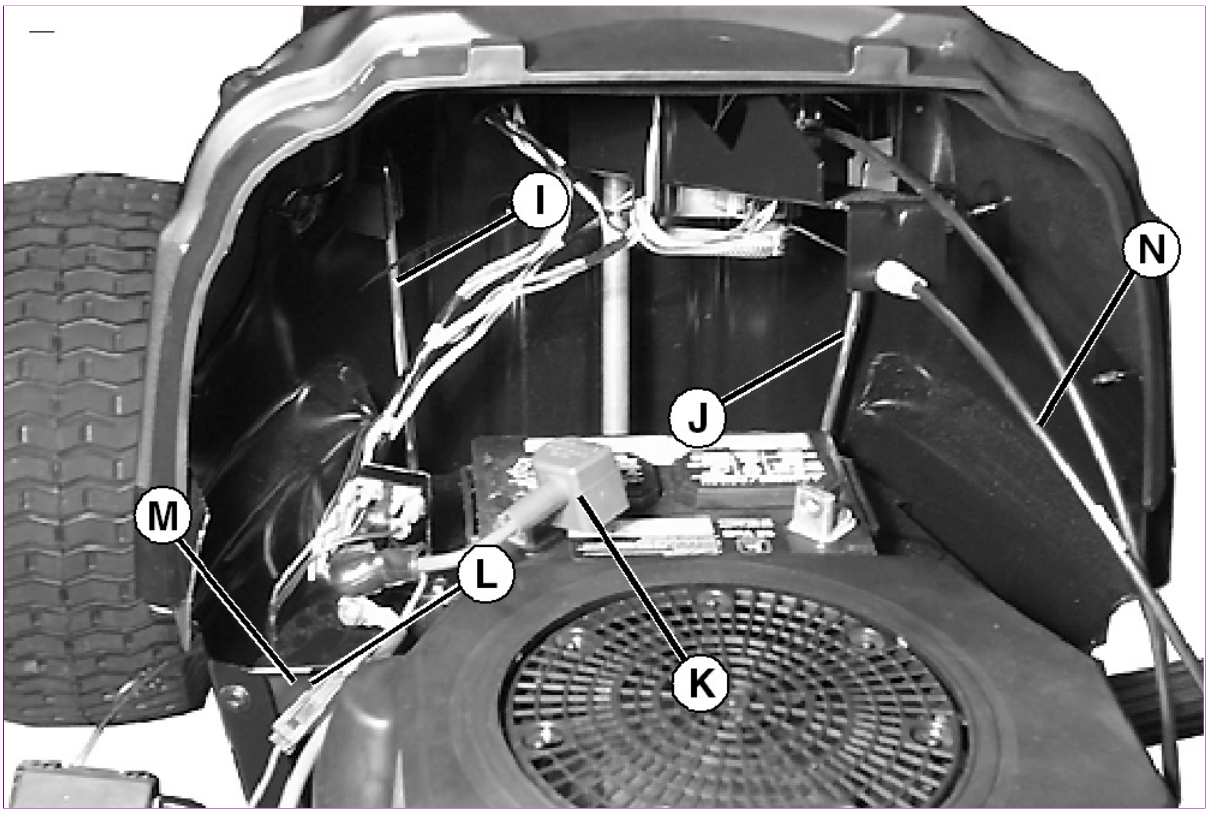

A
B
C
D
E
F

LEGEND:

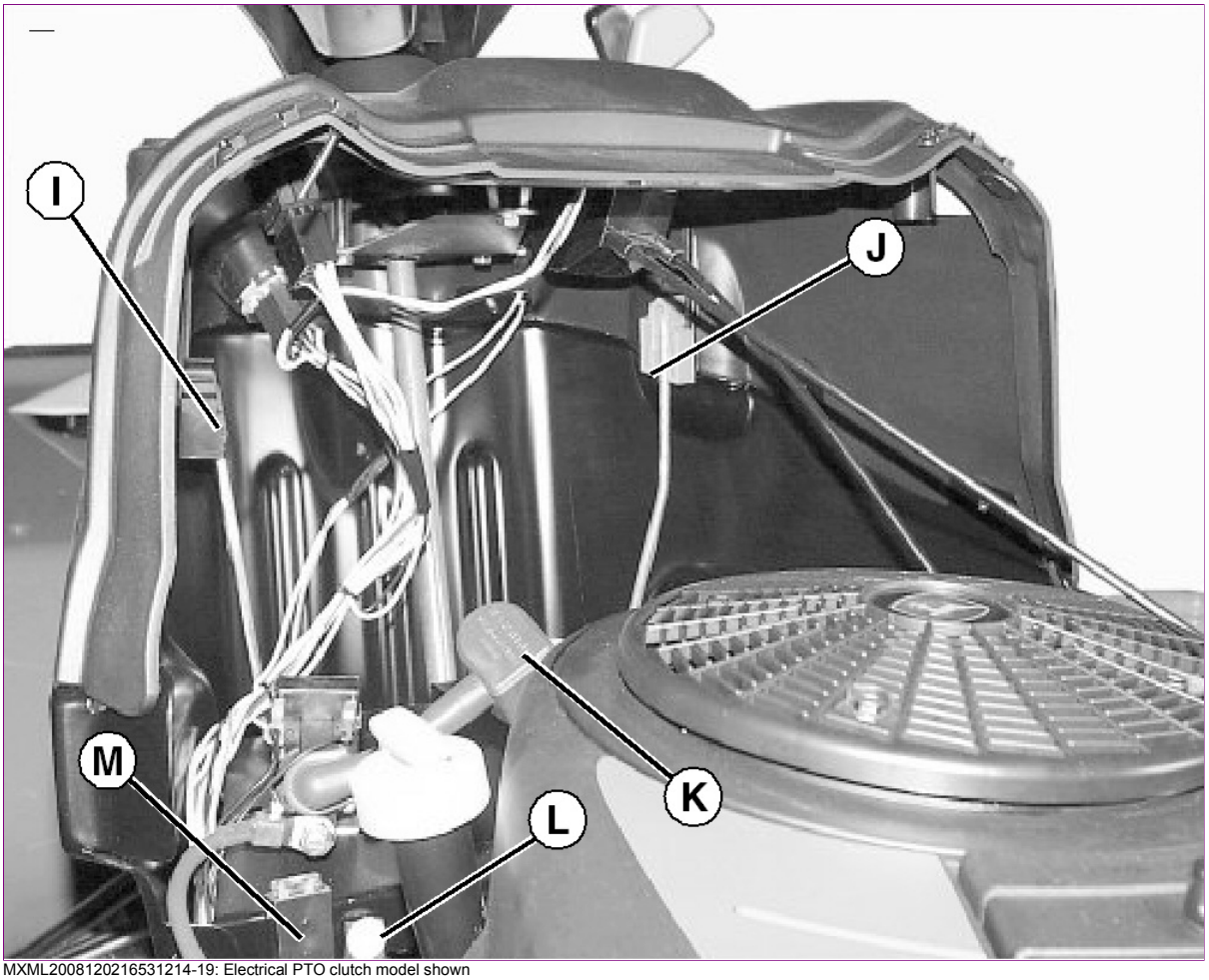
A - Cap
B - Lock Nut
C - Steering Wheel
D - Steering Shaft
E - Bushing (2 used)
F - Plate
G - Steering Pinion Gear
H - Lock Nut

3. 

While holding steering wheel, remove lock nut (H) and steering pinion gear (G) from below machine frame.

4. 

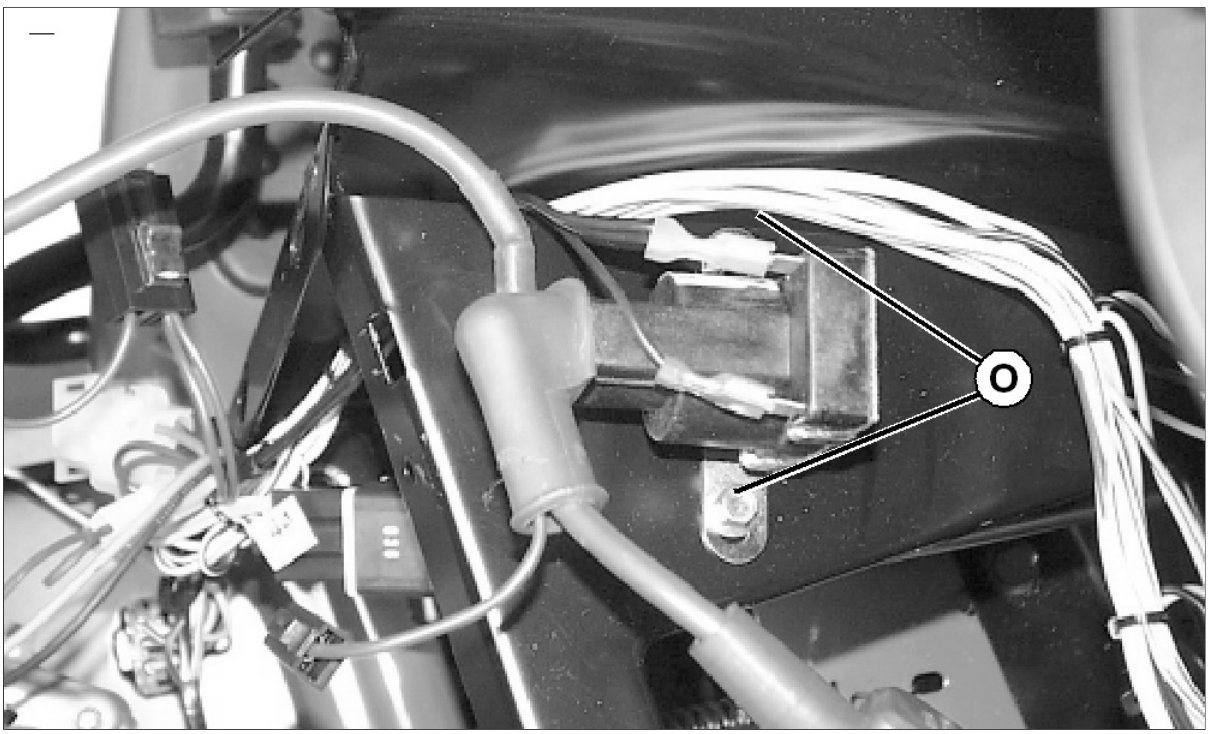
MXML2008120216521213-UN: Manual PTO clutch model shown



MXML2008120216531214-19: Electrical PTO clutch model shown

Remove positive (K) and negative battery cables, and remove battery.

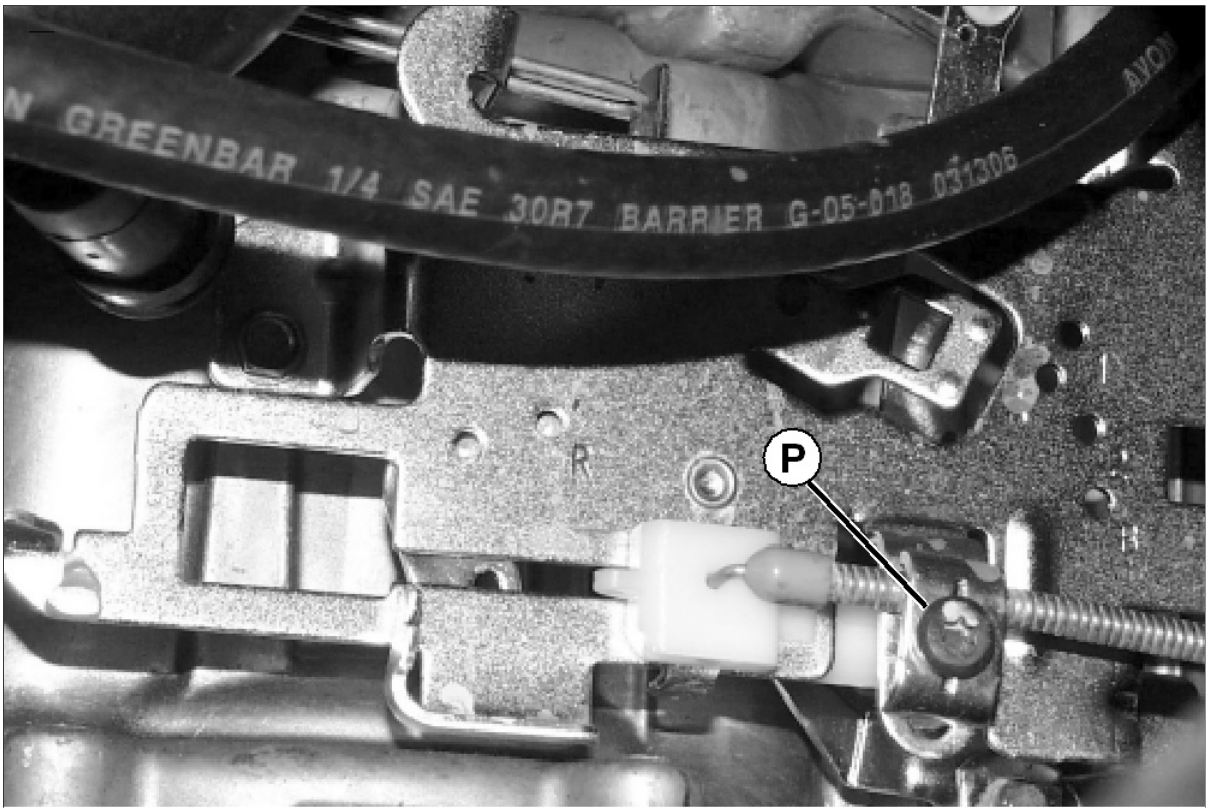
5. Remove fuse holder (M) and relay (L) connector from pedestal frame.
6. Disconnect all electrical connections.
7. Disconnect parking brake rod (J) and cruise control rod (I) from handles (under pedestal housing).
8. Manual PTO models: Note location of PTO cable (N)



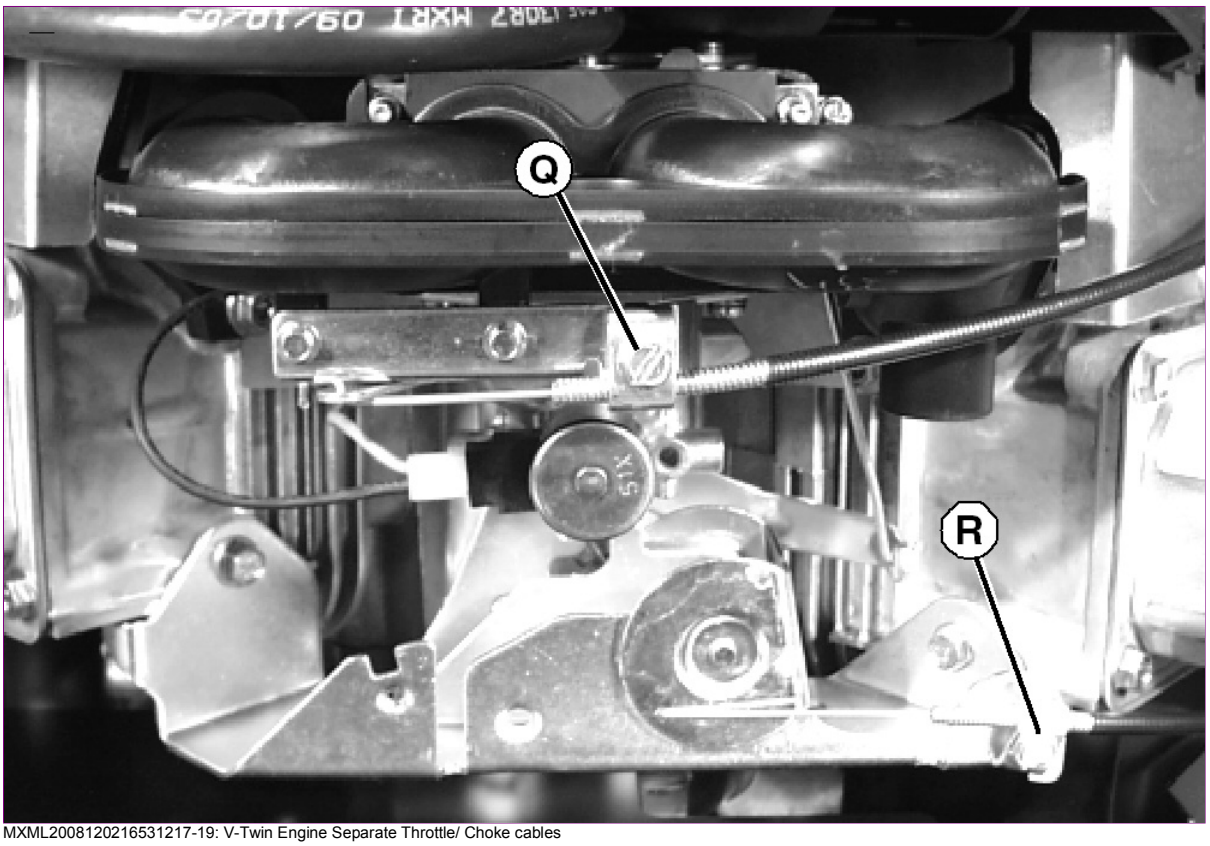
9.

Remove two screws (O) securing starter solenoid to pedestal frame.

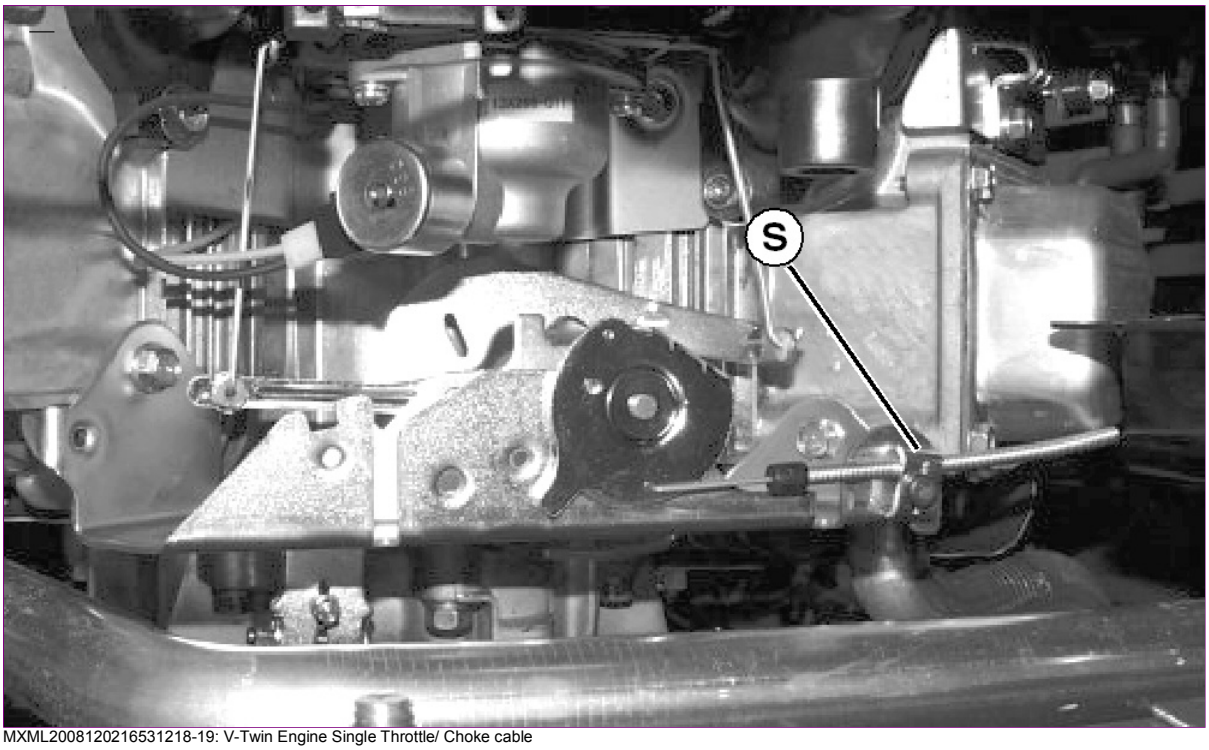
10.



MXML2008120216531216-19: Single Cylinder Engine

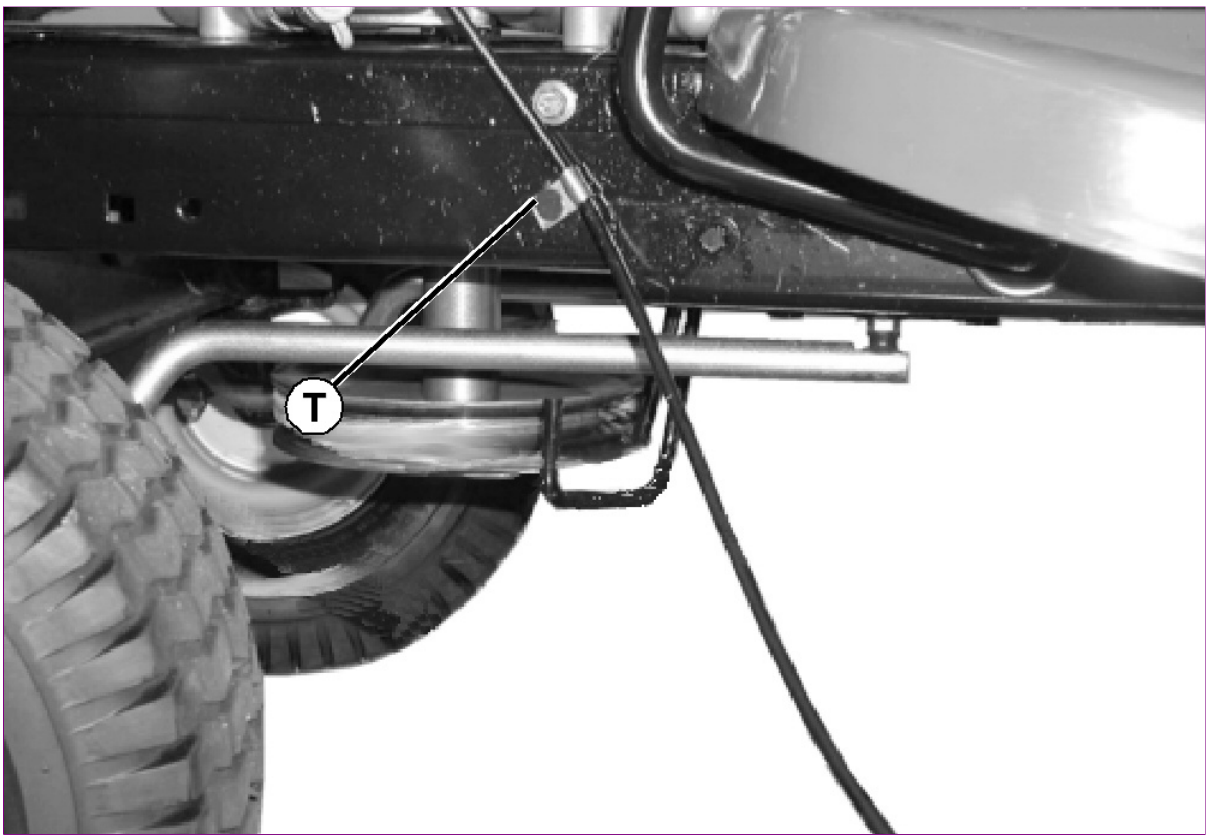


MXML2008120216531217-19: V-Twin Engine Separate Throttle/ Choke cables

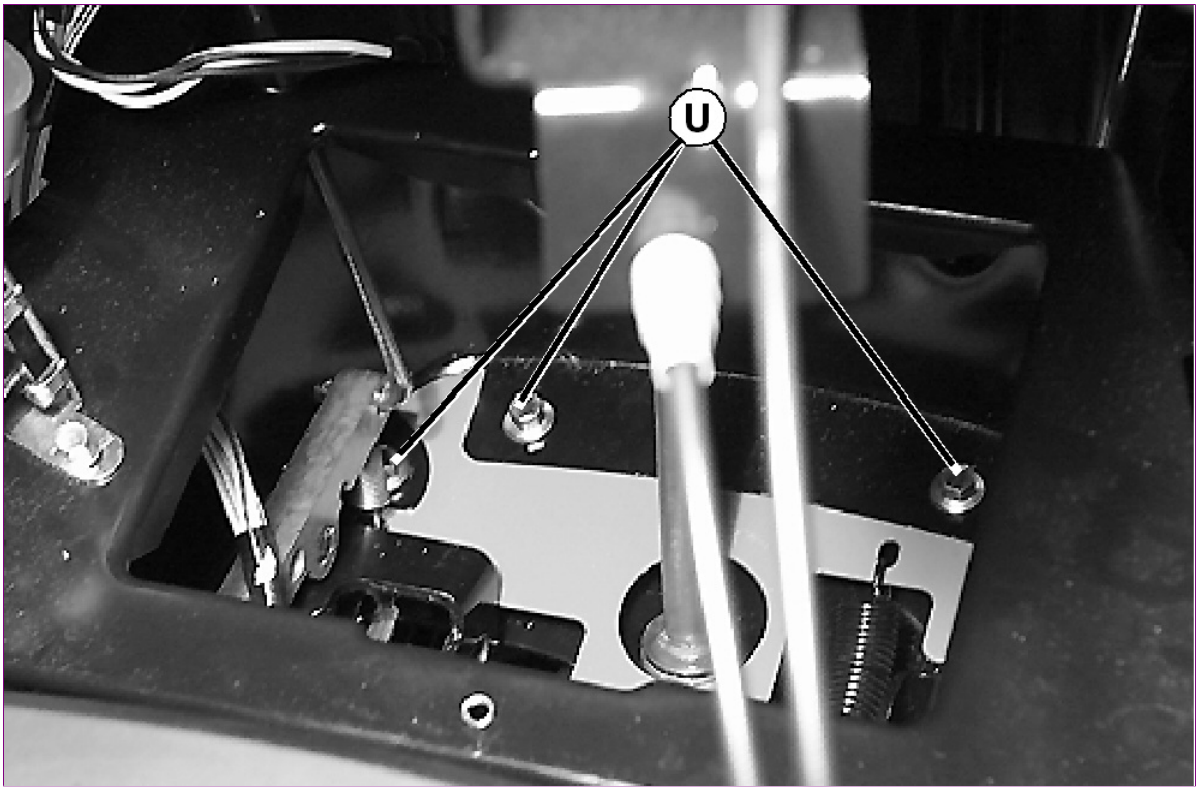


MXML2008120216531218-19: V-Twin Engine Single Throttle/ Choke cable

Disconnect throttle cable (Q) and choke cable (R) (V-twin) at engine. Disconnect single throttle/ choke cable (S) (if equipped).



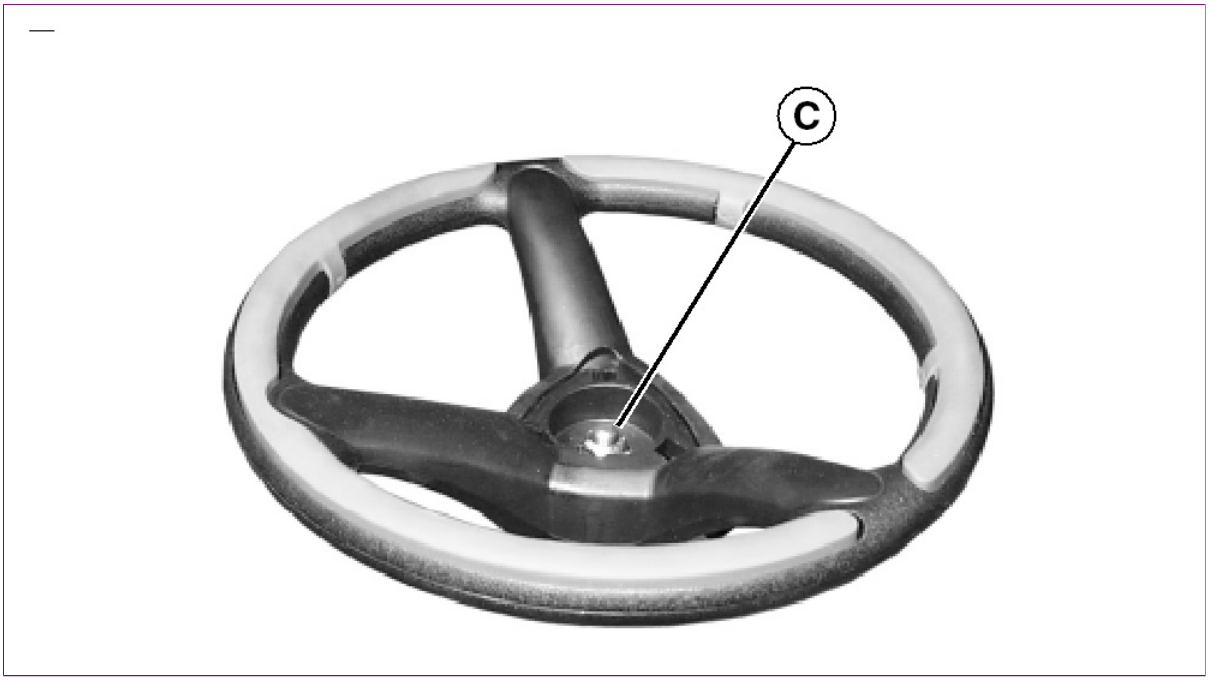
11. Remove PTO engagement cable (T) from clip on the side of frame (manual PTO only).

12. 

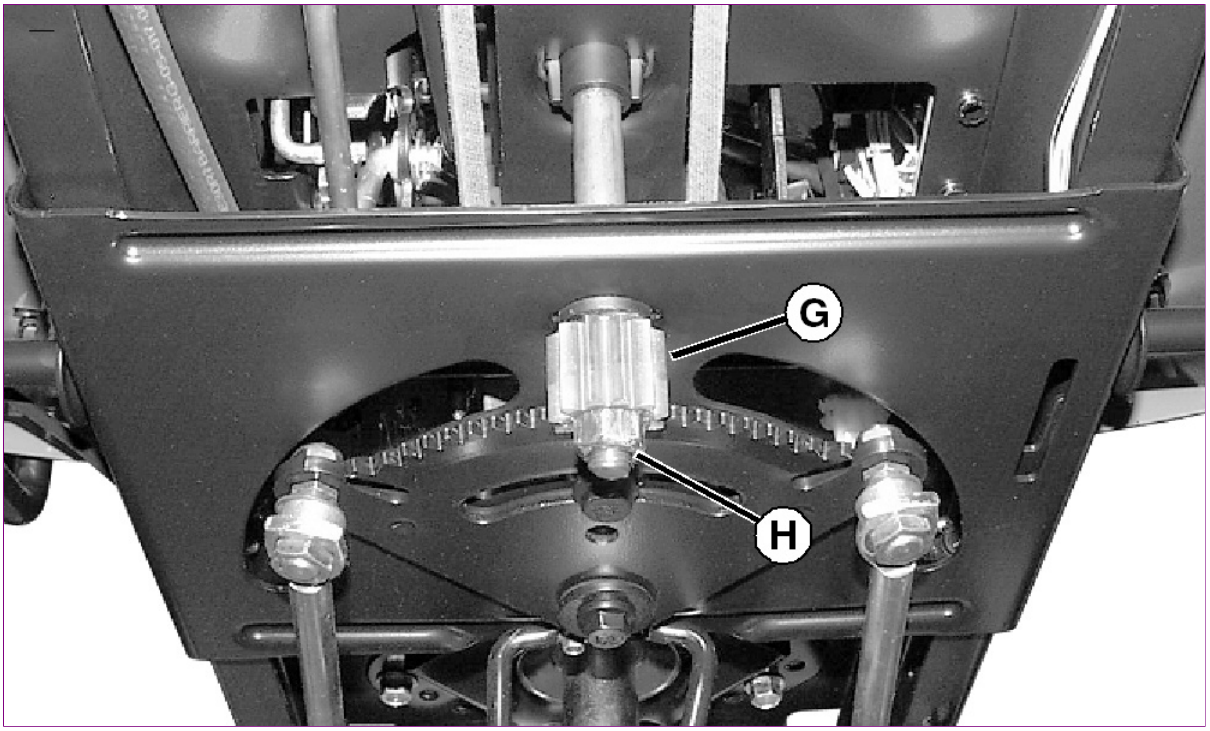
MXML2008120216531220-UN: Manual PTO model shown

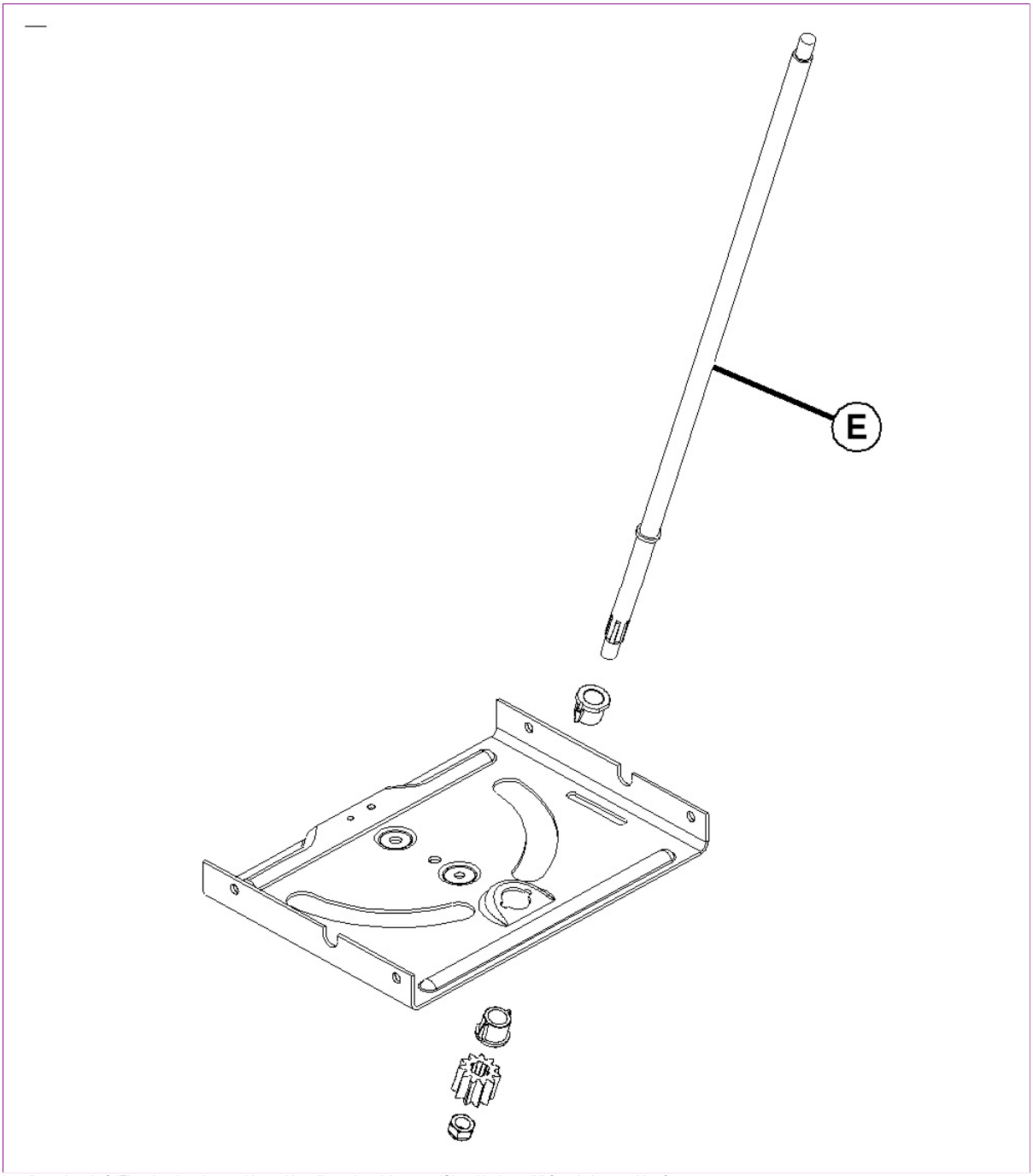
Remove the six screws (U) holding pedestal assembly to the frame. Remove pedestal assembly.

Installation:

1. 

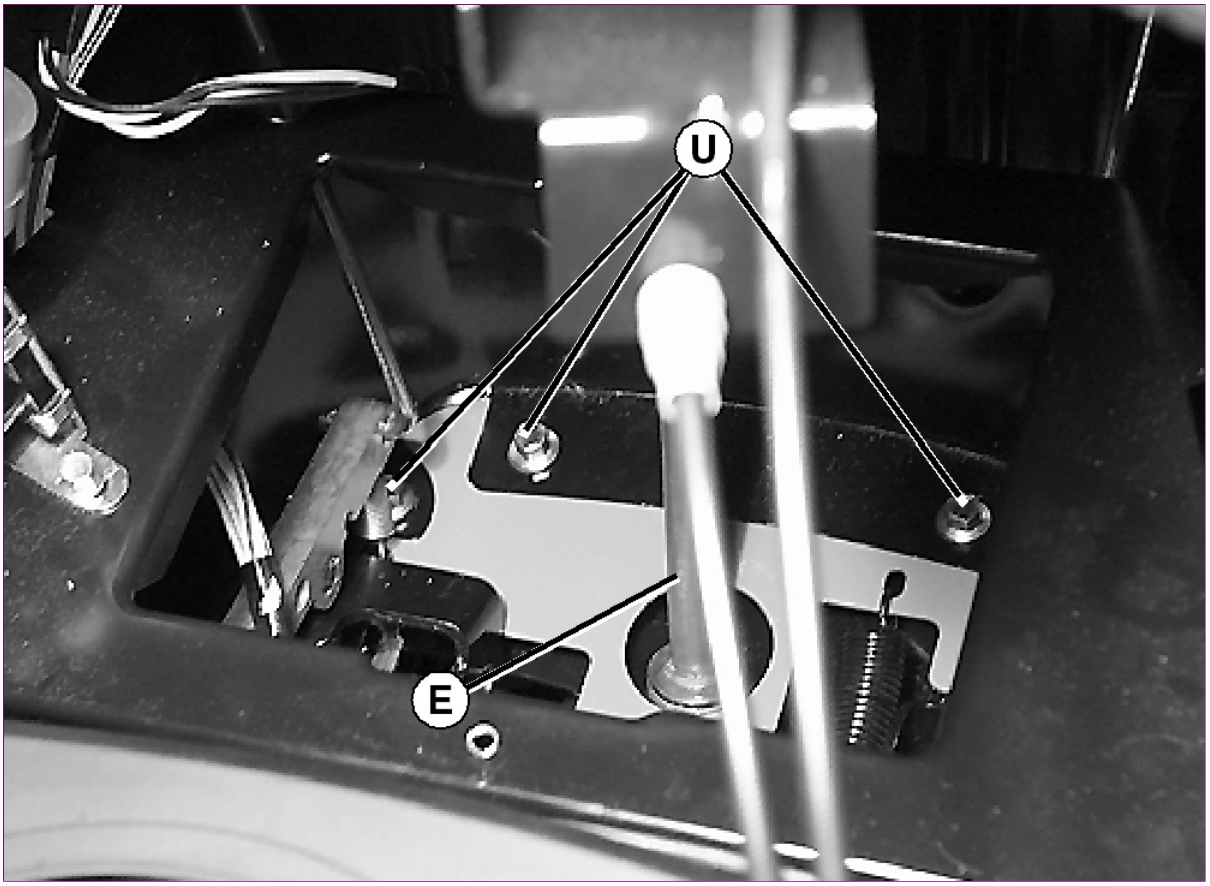
If removed, install steering shaft into pedestal. install steering wheel and lock nut (C) onto steering shaft.

2. 

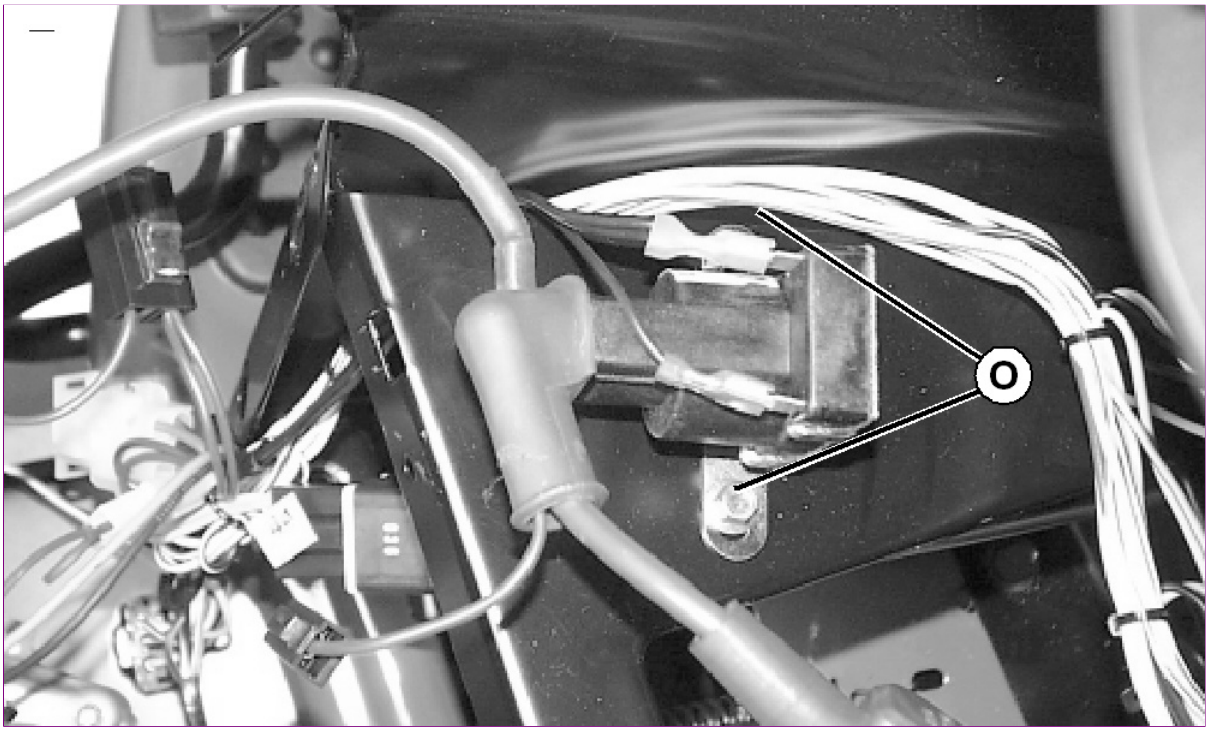


Install steering shaft (E) and pedestal assembly, and install steering pinion gear (G) and lock nut (H) from below machine frame.

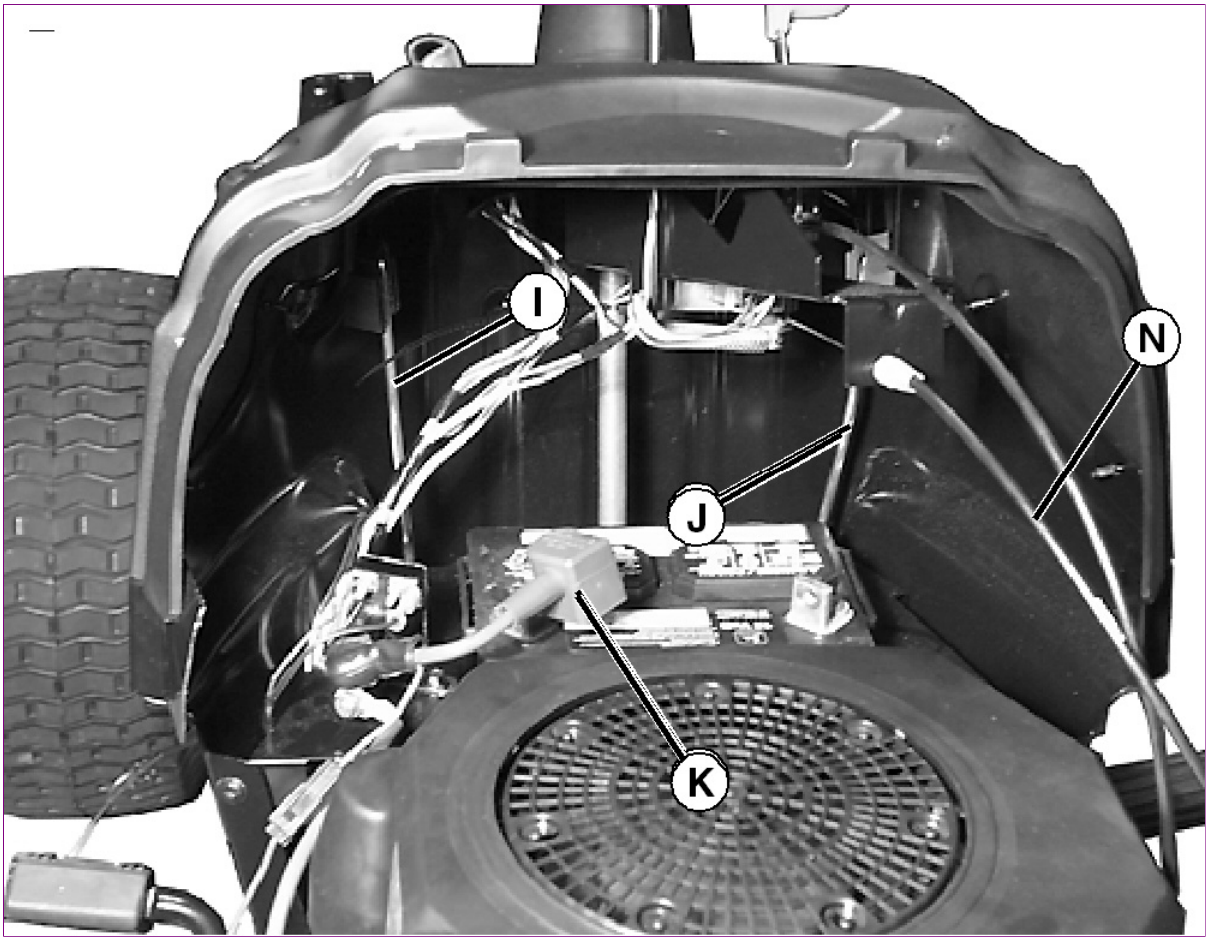
3. Place pedestal down onto frame, taking care to place parking brake rod and cruise control rod through pedestal.

4. 

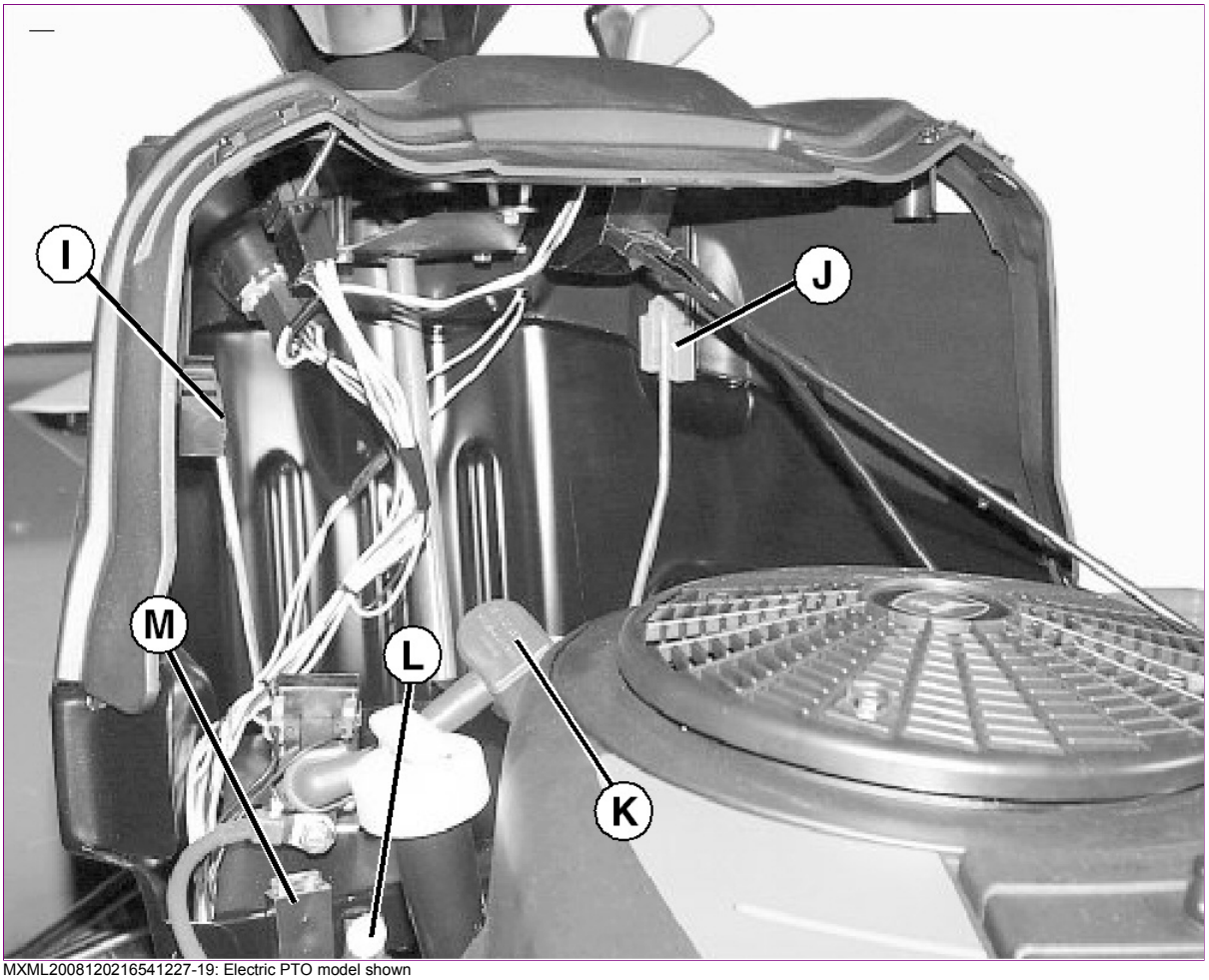
Secure pedestal with six cap screws (U).

5. 

Install two screws (O) securing starter solenoid to pedestal frame.

6. 

MXML2008120216541226-UN: Manual PTO model shown



MXML2008120216541227-19: Electric PTO model shown

Connect throttle cable and PTO engagement cable (N) (manual PTO models).

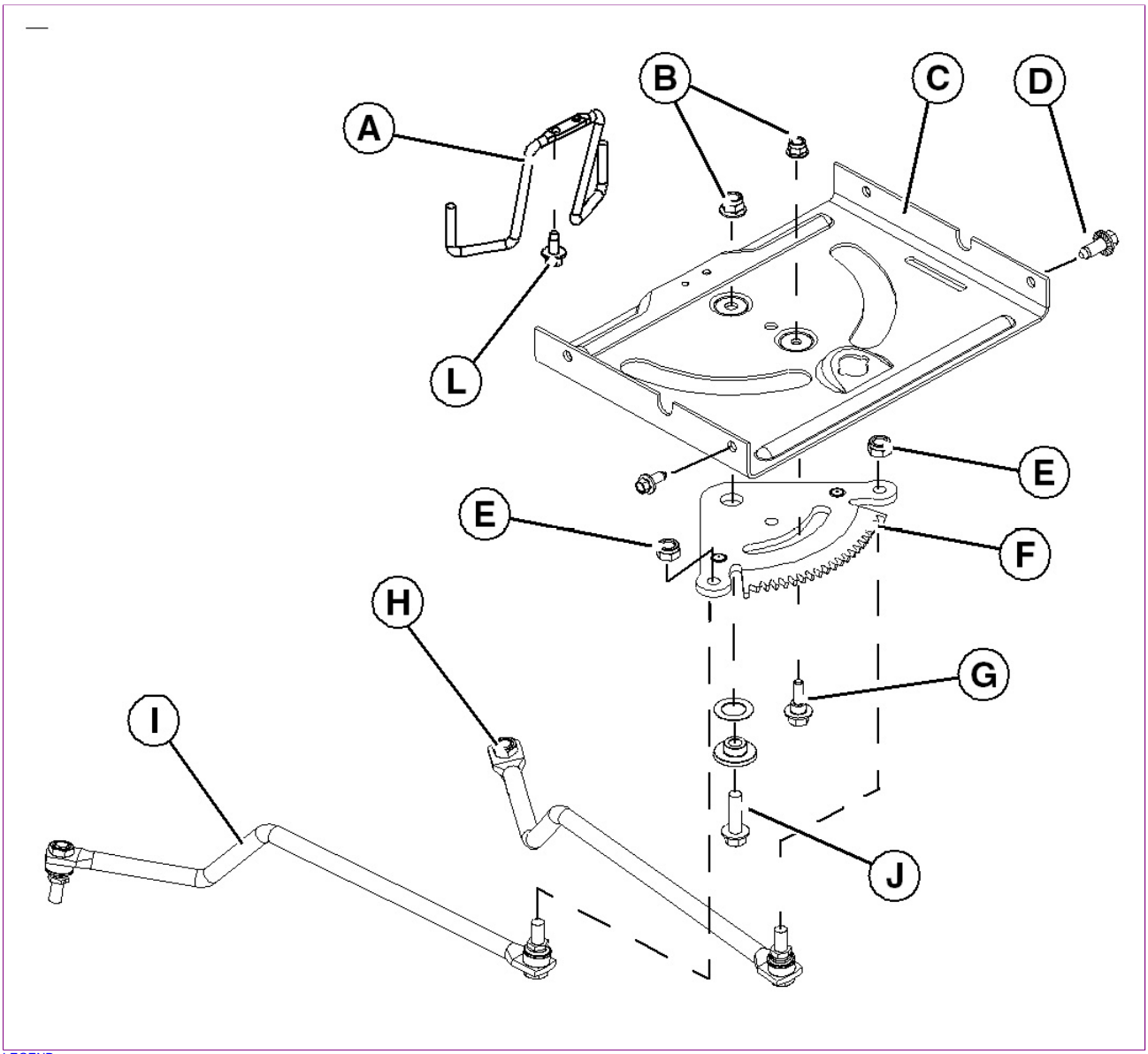
7. Hook parking brake rod (J) and cruise control rod (I) to their respective handles.
8. Install fuse holder (M) and relay (L) connector to pedestal frame.
9. Connect all electrical connections.
10. Install battery, and connect positive (K) and negative battery cables.
11. Lower machine and install mower deck. See Attachments section.
12. On single cylinder engines, perform choke/throttle cable adjustment. See Throttle/Choke Cable Adjustment in the engine section.
13. On V-twin engines, perform throttle and choke cable adjustments. See Throttle Cable Adjustment and See Choke Cable Adjustment in the engine section. See Throttle/Choke Cable Adjustment - All Models See “Throttle/ Choke Cable Adjustment” on page 70 in the engine section.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Steering Sector Gear Removal and Installation

Steering Sector Gear Removal and Installation

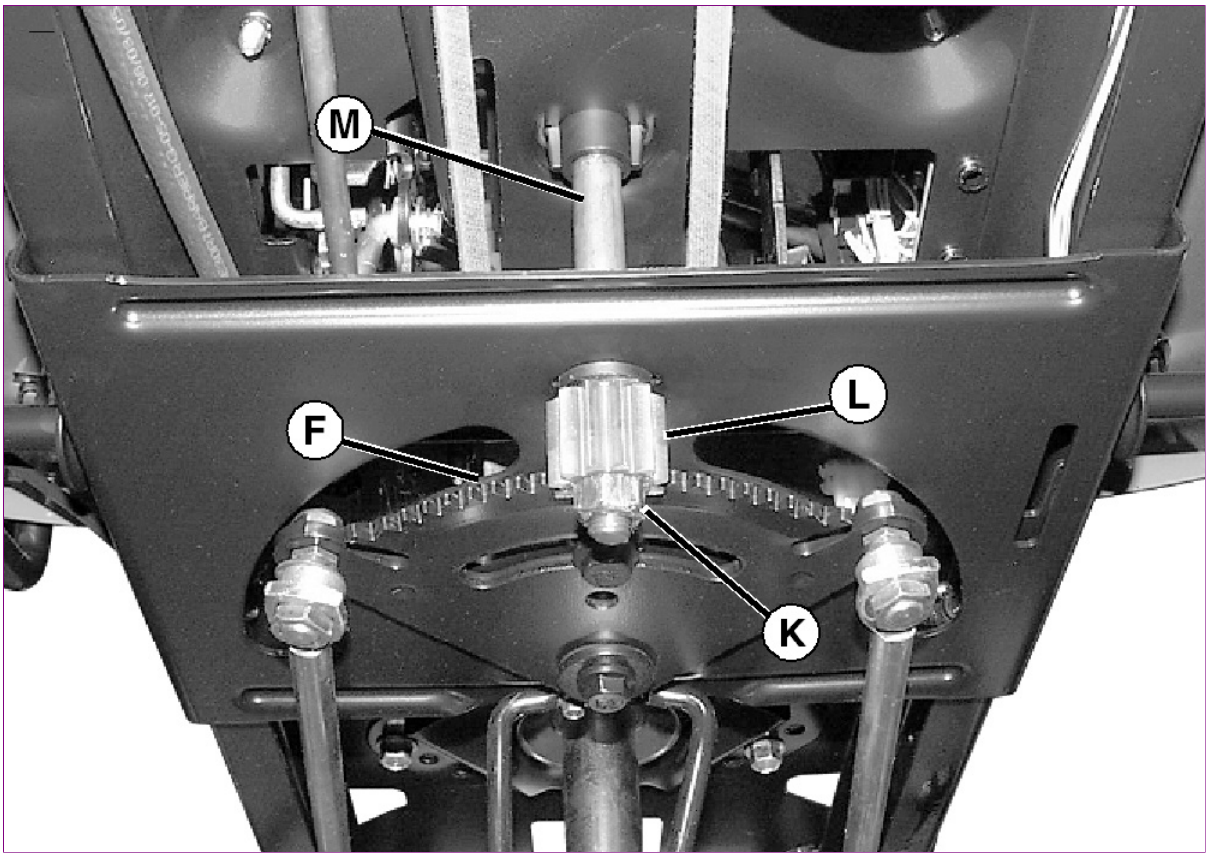
Removal:

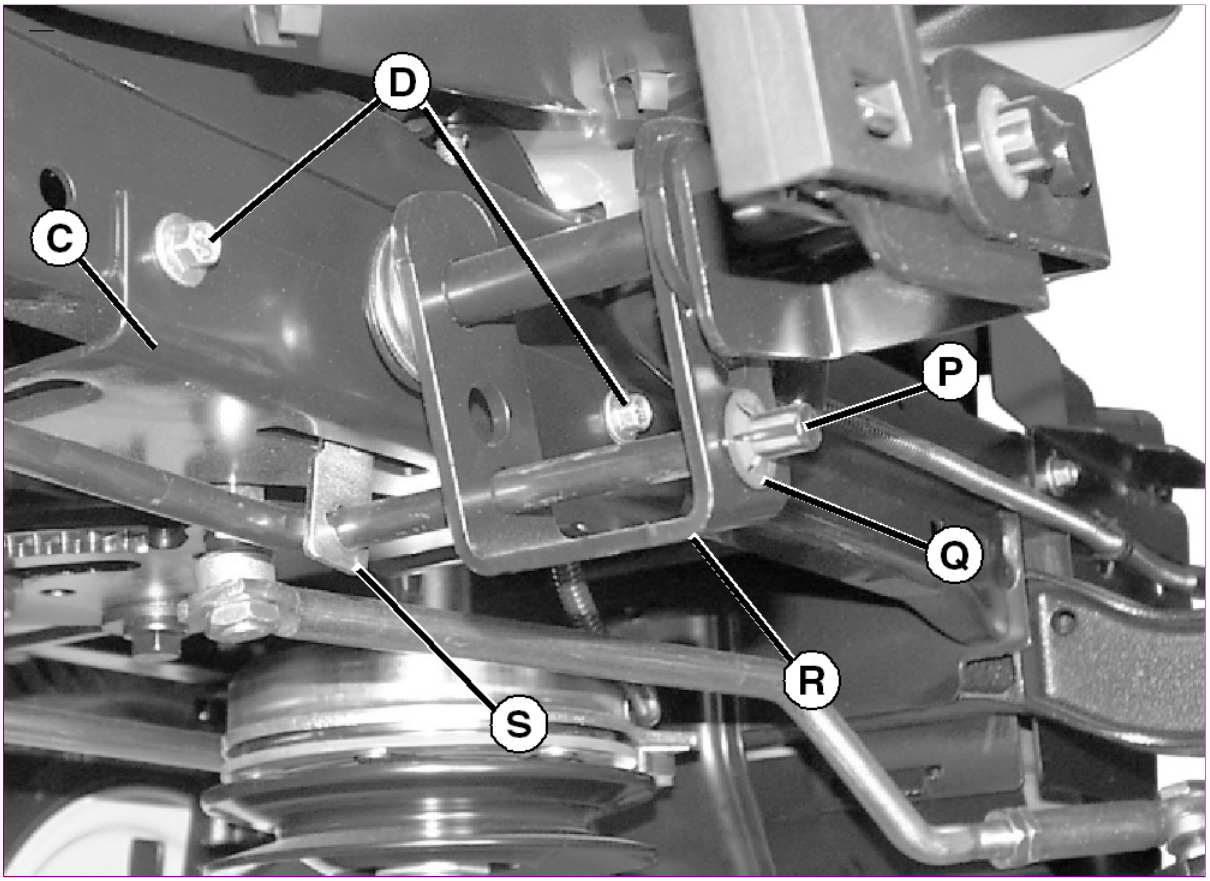
1. Disconnect battery and remove.
2. Remove mower deck. See Removing Mower Deck of the Attachments section.
3. Safely raise front and back wheels to a working height.



LEGEND:

A - Belt Guide (LA100, LA110, and LA120 Models Only)
B - Lock Nut
C - Plate
D - Screw (self-tapping)
E - Lock Nut
F - Steering Sector Gear
G - Shoulder Screw
H - Left Drag Link
I - Right Drag Link
J - Screw

4. 

Remove nut (K) and pinion gear (L).
5. Raise steering control rod (M) just enough to clear sector gear (F).
6. 

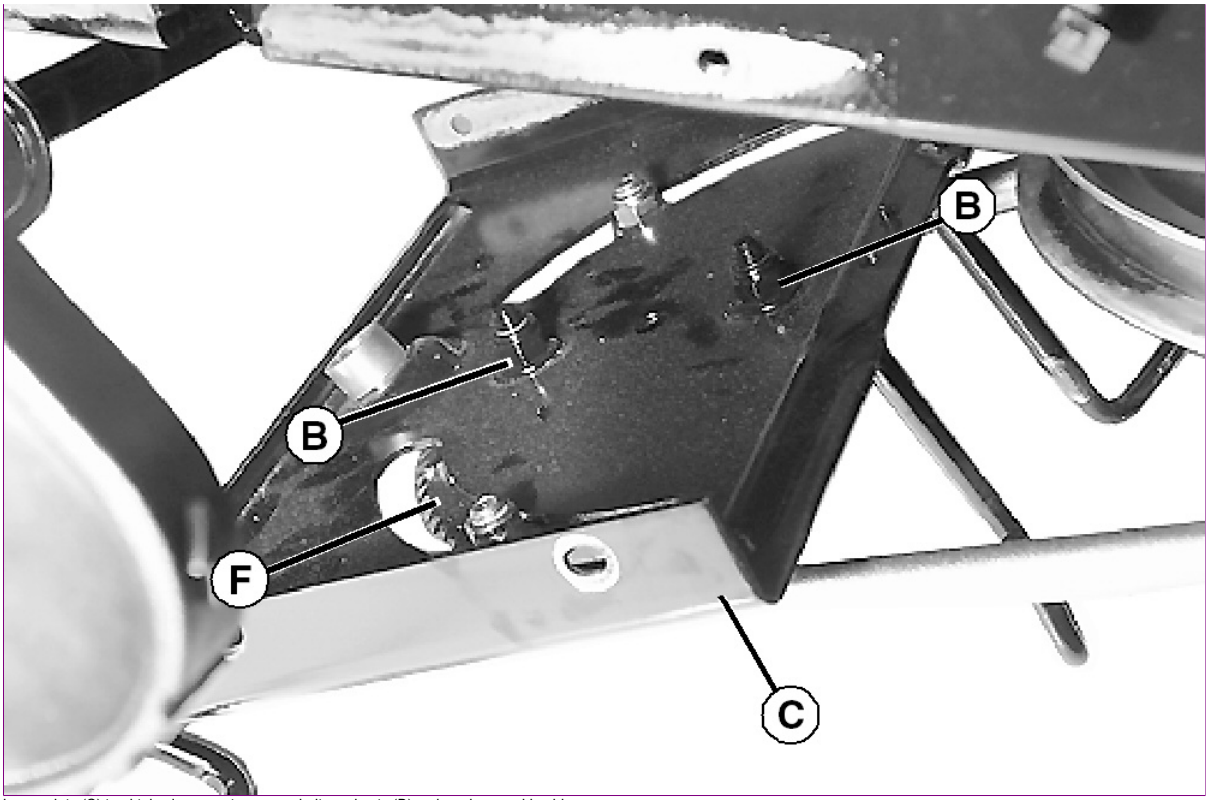
Hydro models: Remove retainer (Q) from forward/reverse rod (P), and remove rod from pedal assembly (R) and cruise control bracket (S).
7. **IMPORTANT:**

Remove nut from draglinks (H and I) at wheel end before lowering plate (C). This prevents breakage of ball joints.

8. Remove screws (D) from bracket (C) on both sides of machine.

NOTE:

Be careful when lowering plate (C). Note location for hardware and linkage for forward/reverse pedal assembly during this procedure.

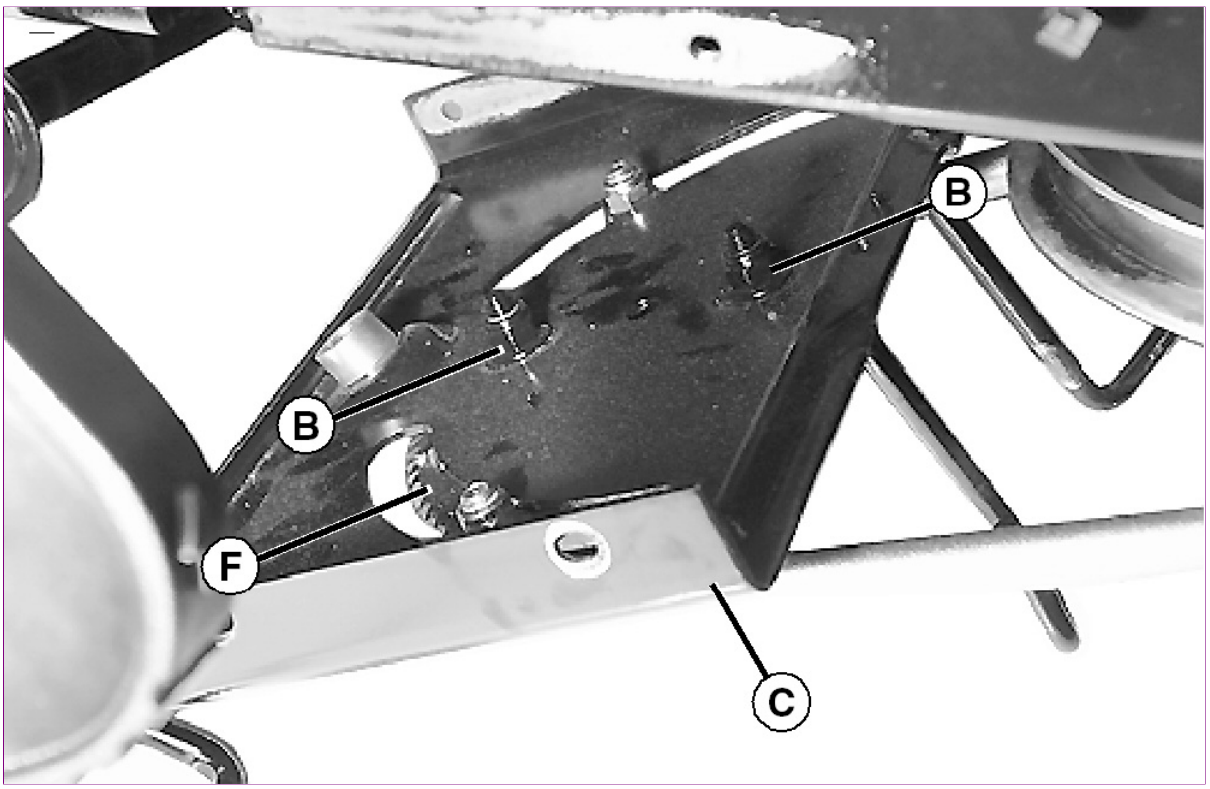


Lower plate (C) to obtain clearance to remove bolts and nuts (B) and washers and bushings.

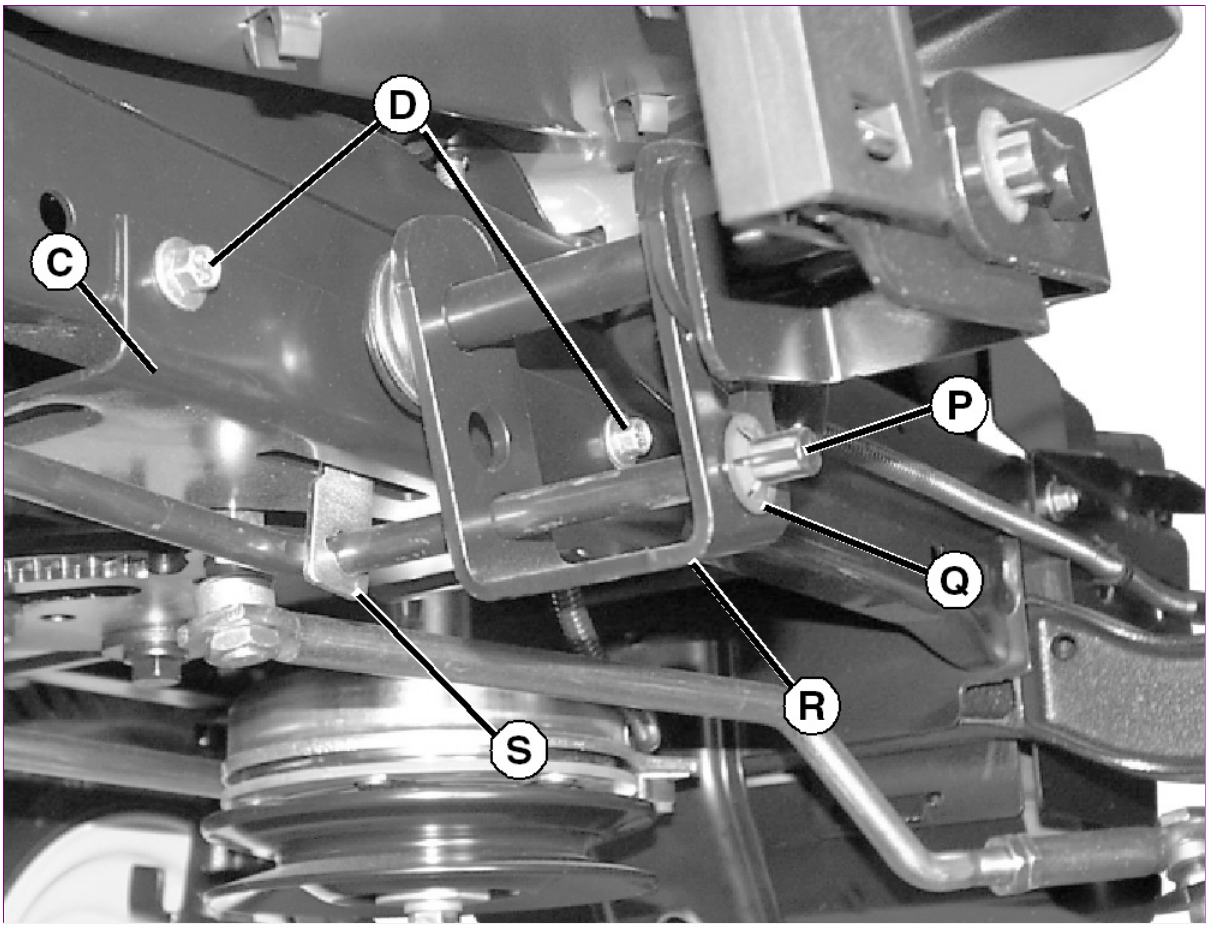
9. Lower gear (F) from bracket and inspect for wear or damage.

Installation:

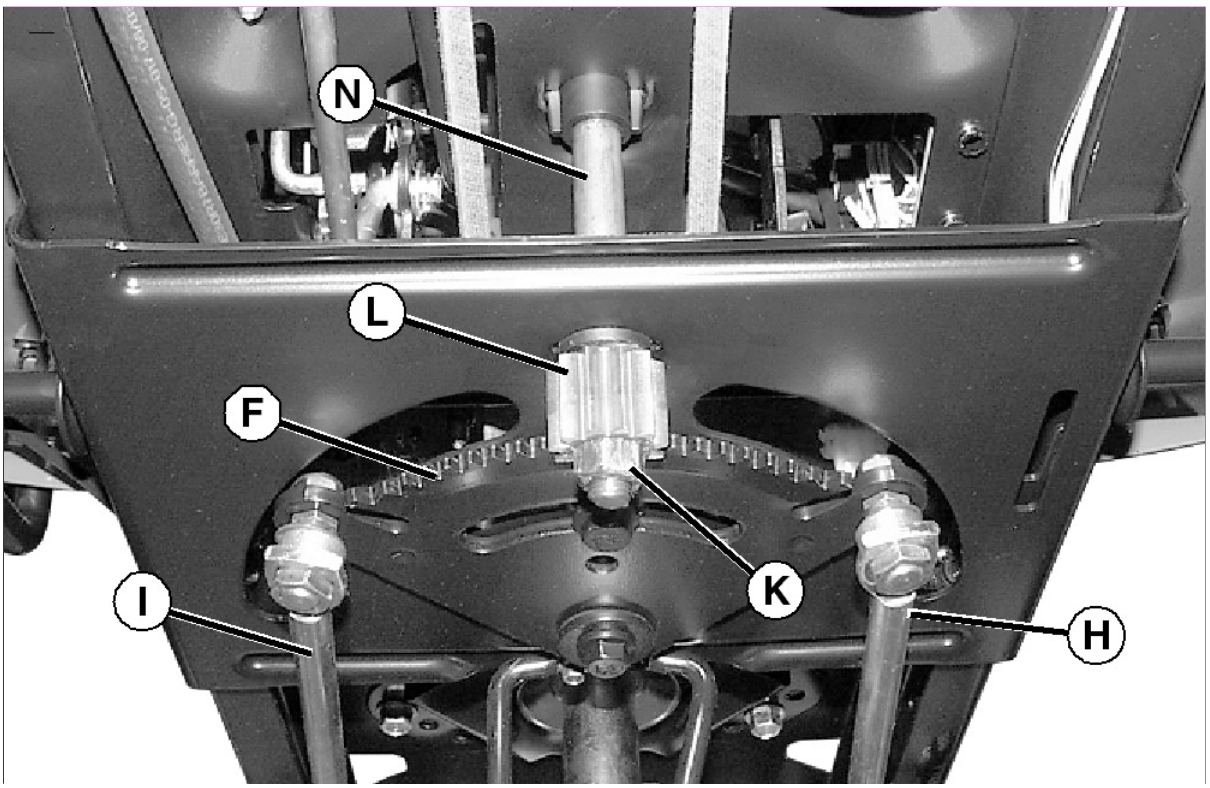
1.



Place gear (F) onto plate (C), and attach with screws, bushings, washers, and nuts (B).

2. 

Raise forward/reverse pedal assembly (R) and bracket assembly (C) up to machine and secure with screws (D).
3. Hydro models: Attach forward/reverse rod (P) through cruise control bracket (S) and pedal assembly (R), and secure with retainer (Q).

4. 

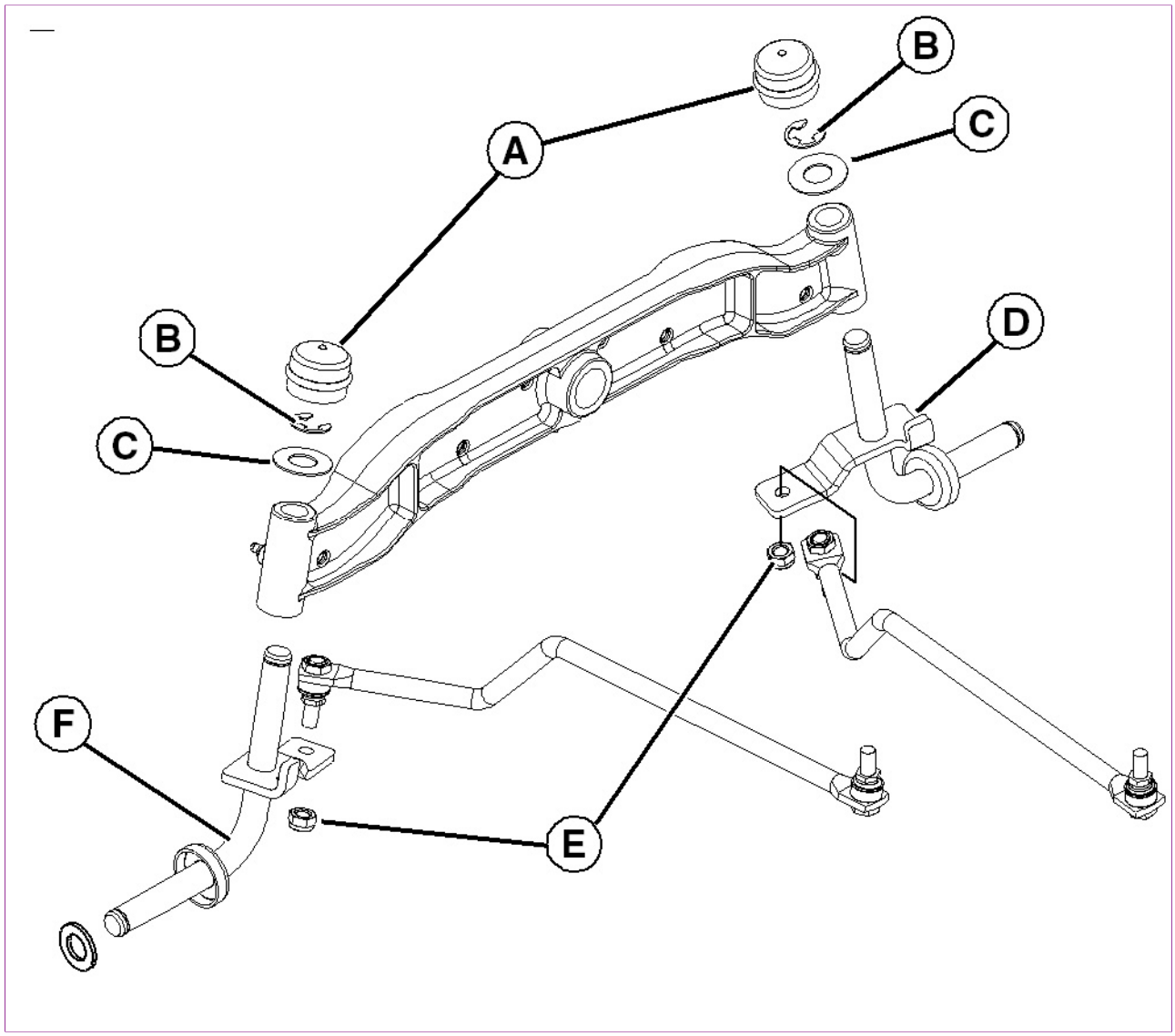
Lower steering rod (N) and put pinion gear (L) onto shaft and secure with nut (K).
5. Reattach drag links (H and I) to front wheel spindles.
6. Lower machine and install mower deck.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Front Axle Spindle Replacement

Front Axle Spindle Replacement

Removal:

1. Remove front wheel. See Front Wheel Removal and Installation in the Miscellaneous section.



2. Remove lock nuts (E) securing drag links onto spindles.
3. Remove plastic cap (A) from top of spindle.
4. Remove E-ring (B) and washer (C) from top end of each spindle.
5. Remove spindles (D and F) from front axle.

Installation:

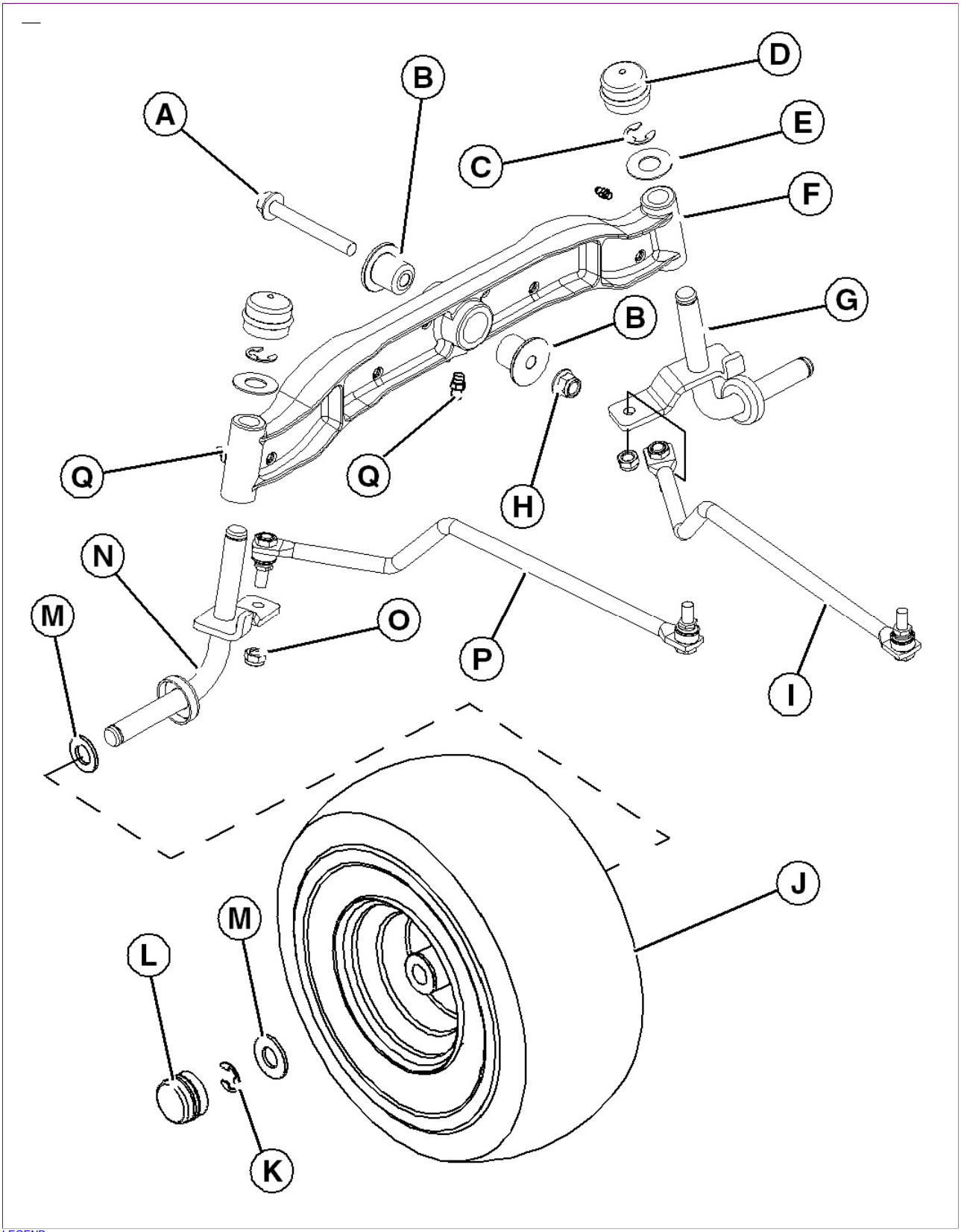
1. Install new spindles on front axle.
2. Retain each spindle with washer and E-ring.
3. Install plastic cap on top of each spindle.
4. Install right and left drag links onto front of spindles and secure with lock nuts.
5. Install front wheels.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Front Axle Removal and Installation

Front Axle Removal and Installation

Removal:

1. Disconnect battery and remove.
2. Remove mower deck.
3. Safely raise front and back wheels to a working height.

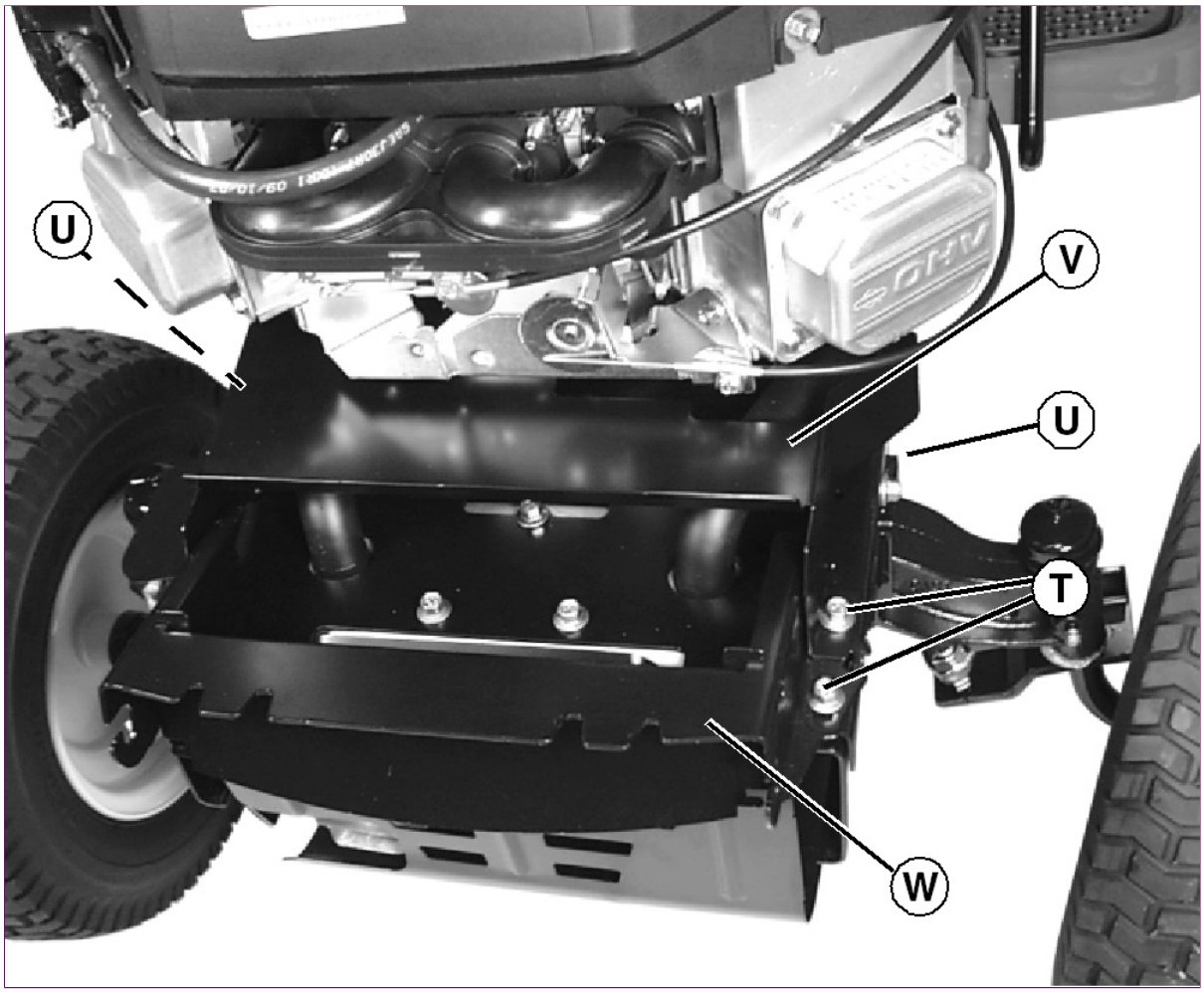


LEGEND:

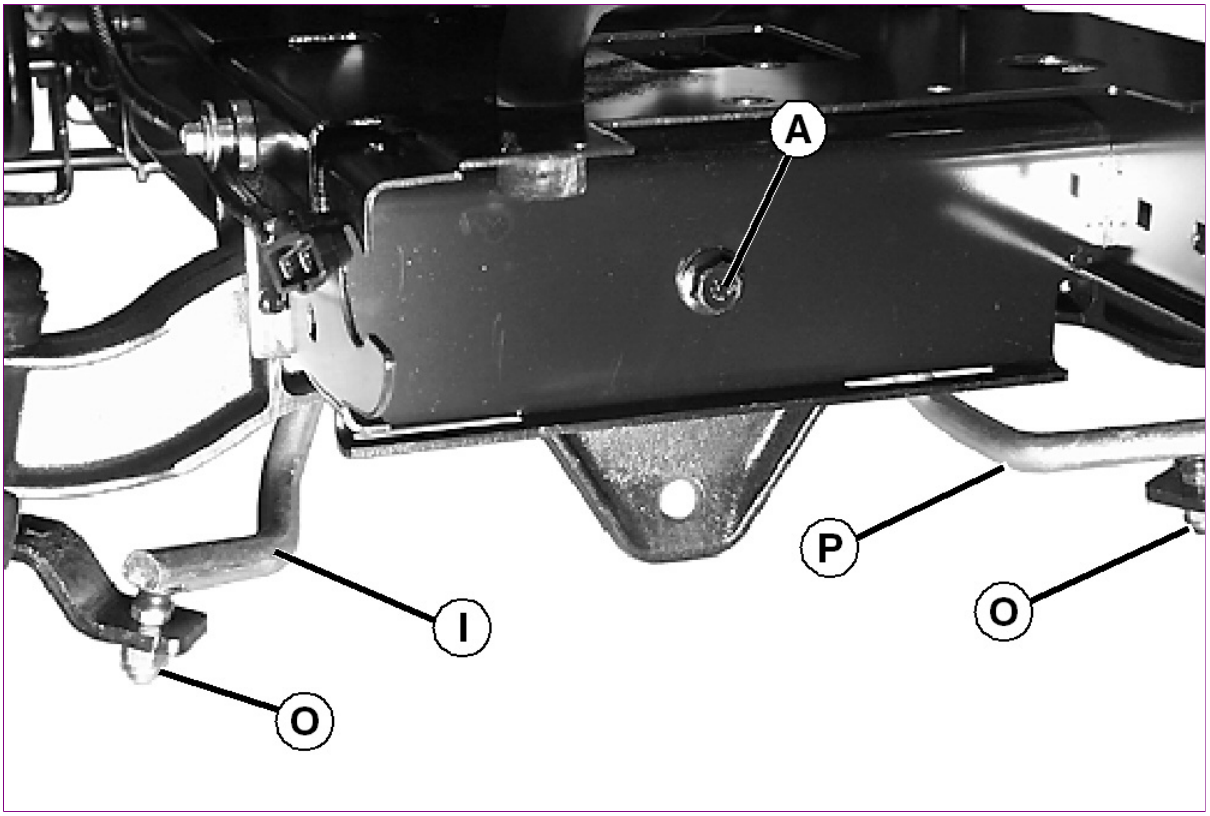
A - Screw
B - Bushing
C - Retainer
D - Cap
E - Washer
F - Front Axle
G - Right Spindle
H - Lock Nut

I - Right Drag Link
J - Front Wheel
K - Snap Ring
L - Cap
M - Washer
N - Left Spindle
O - Lock Nut
P - Left Drag Link
Q - Lubrication Fitting

4. Remove cap (L), snap ring (K), washer (M) and wheel (J) from each side of machine spindle.
5. Remove muffler:



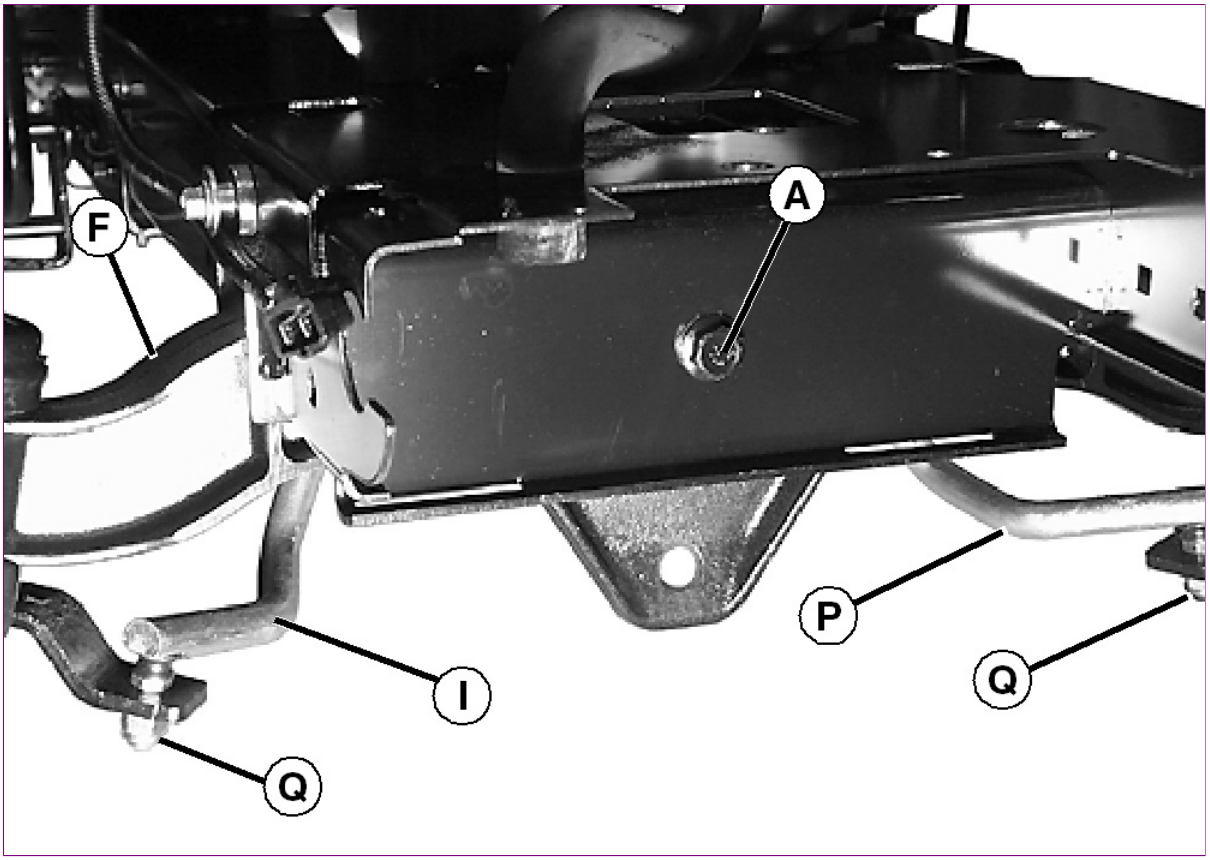
   - Remove the two top cap screws (T) and the two side cap screws (U), and remove both the top (V) and bottom (W) heat shields.
   - Remove muffler by removing the four cap screws securing muffler to engine and the three cap screws securing muffler to frame.

6. 

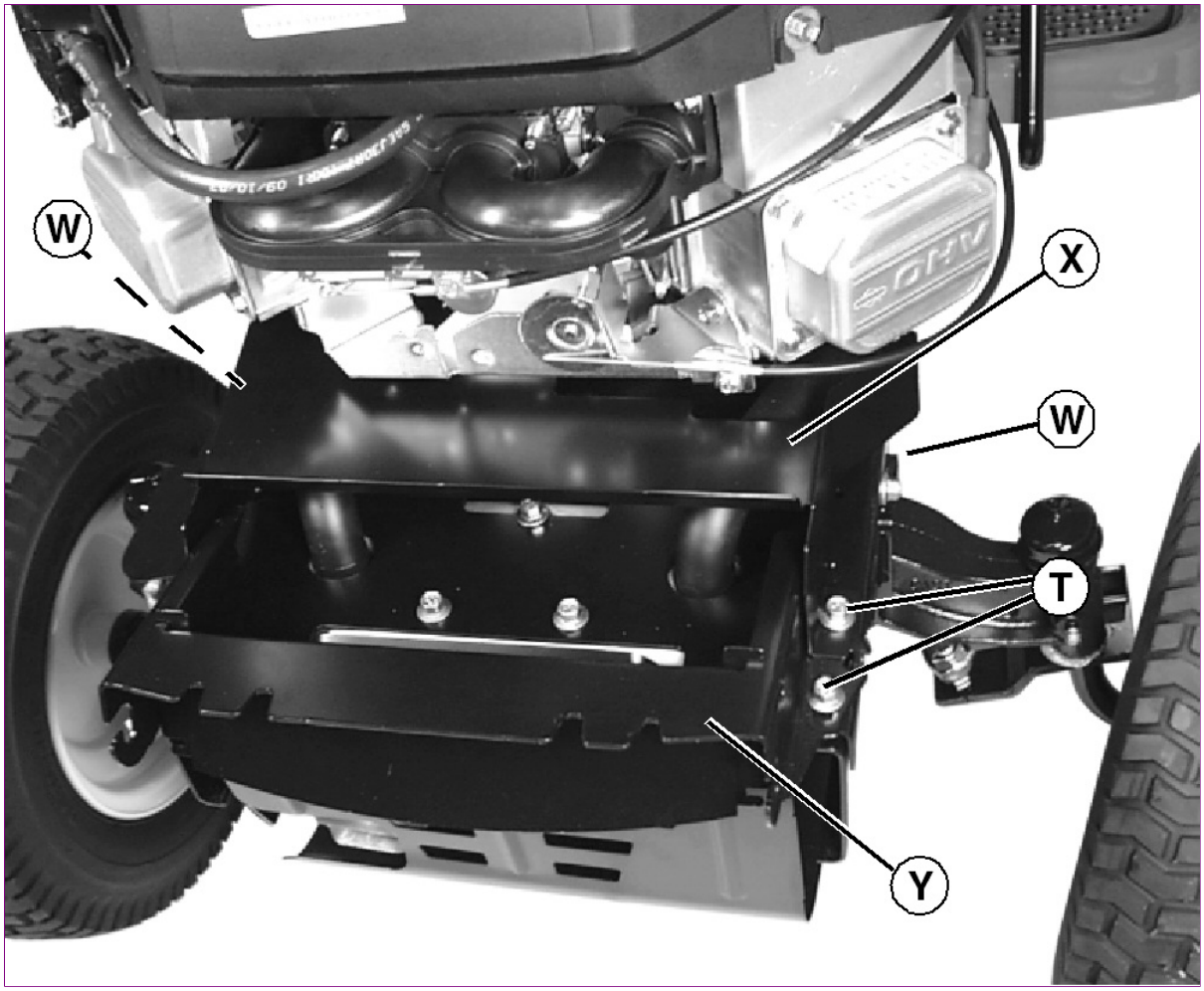
   Remove nuts (O) holding left (P) and right (I) drag links onto spindles.
7. Remove nut, washer and screw (A) holding front axle onto frame.
8. Lower front axle from frame. Remove bushings (B) from front axle and inspect all parts for wear or damage.

Installation:

1. Install bushings (B) onto front axle.



2. Raise front axle up into front of frame and place screw (A) and nut through frame and front axle. Tighten nut to **122 N•m (90 lb-ft)** .
3. Install right (I) and left (P) drag links onto front spindles and secure with nuts (Q). Tighten nuts (Q) to **29 N•m (21 lb-ft)** .
4. Install muffler:



- Raise muffler and install the four cap screws securing muffler to engine and the three cap screws securing muffler to frame.
- Install the top (X) and bottom (Y) heat shields. Secure with cap screws (T) and (W).

5. Install front wheels and hardware.
6. Lower machine to ground level.
7. Install mower deck.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
General Specifications

General Specifications

Item	Measurement	Specification
LA100:		
Type		External Disk
Parking		Pedal
Brake Pad Minimum Thickness		6 mm 0.250 in.)
Compression Spring Bracket to Brake Rod Stop Tabs		7 - 9 mm 0.28 - 0.35 in.)

Item	Measurement	Specification
LA110, LA120, LA130, LA140 and LA150 Machines:		
Type		Internal Disk
Parking		Pedal
Brake lever travel (Maximum)		30
Compression Spring Bracket to Brake Rod Stop Tabs		7 - 9 mm 0.28 - 0.35 in.)

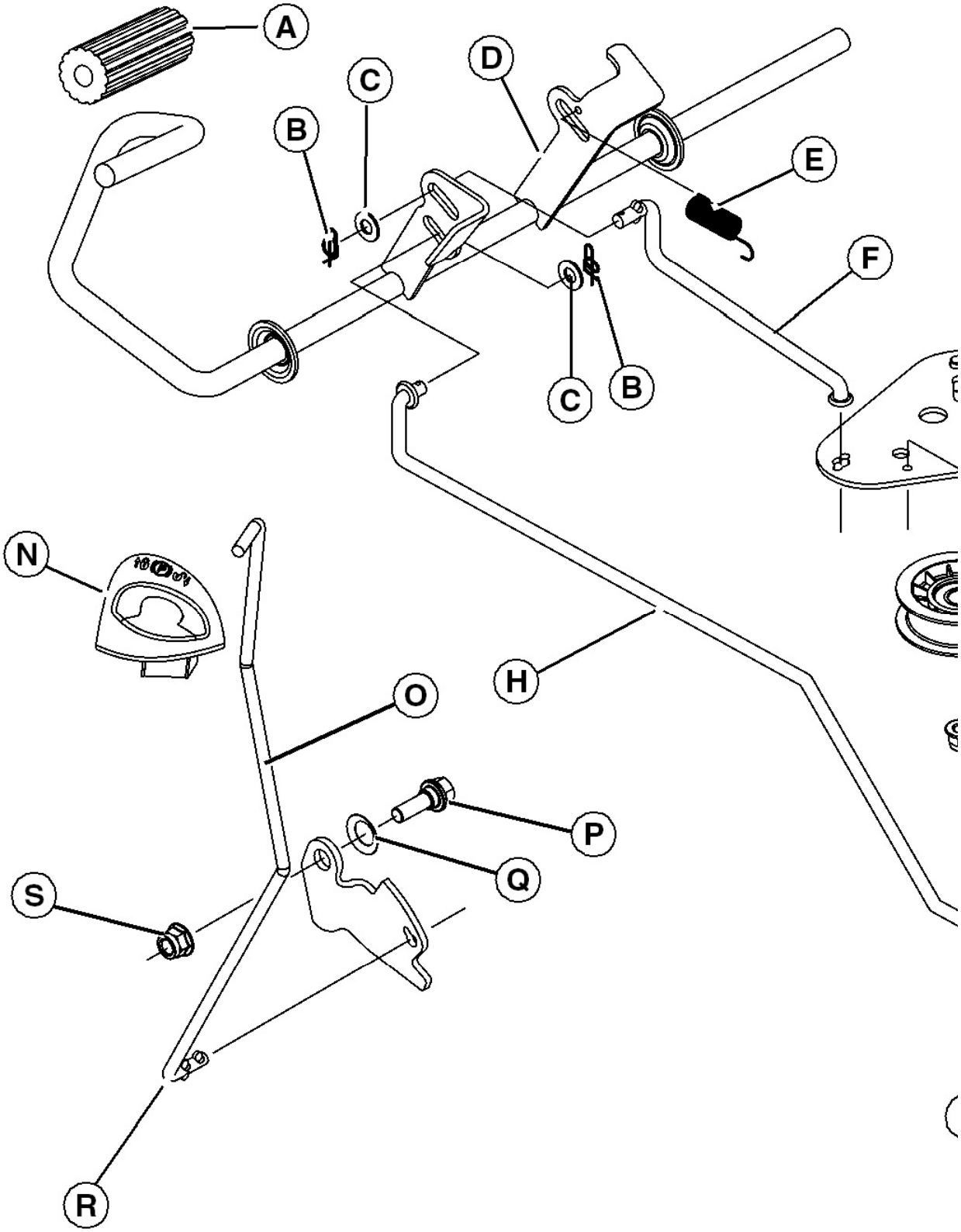
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Torque Specifications

Torque Specifications

Item	Measurement	Specification
Gear Transmission Machines:		
Brake Assembly Cap Screws		20 N•m 180 lb-in.)

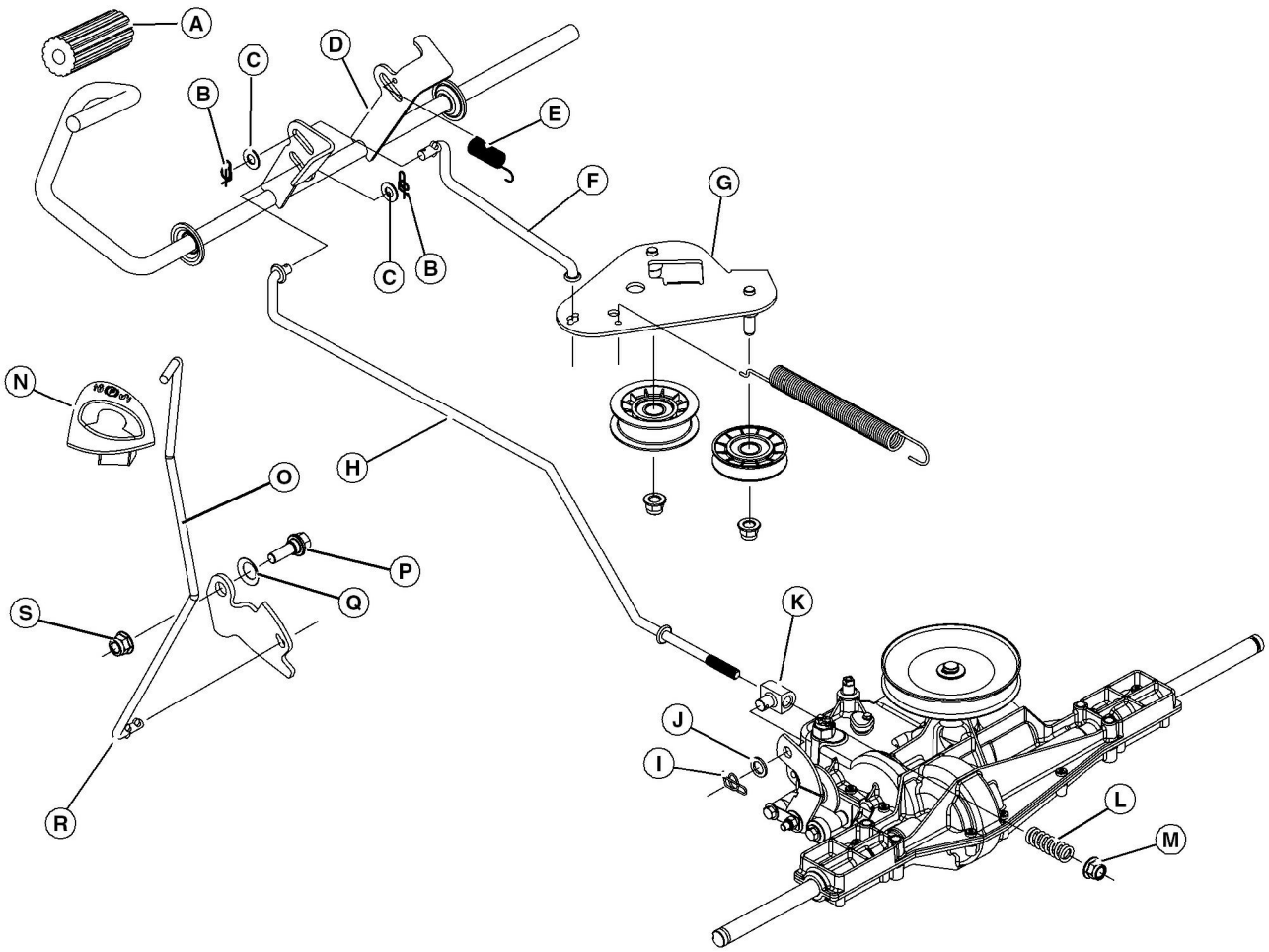
Item	Measurement	Specification
Hydrostatic Transmission Machines:		
Brake Lever Bracket Cap Screws		52 N•m 38 lb-ft)

Brake System - Gear Transaxle

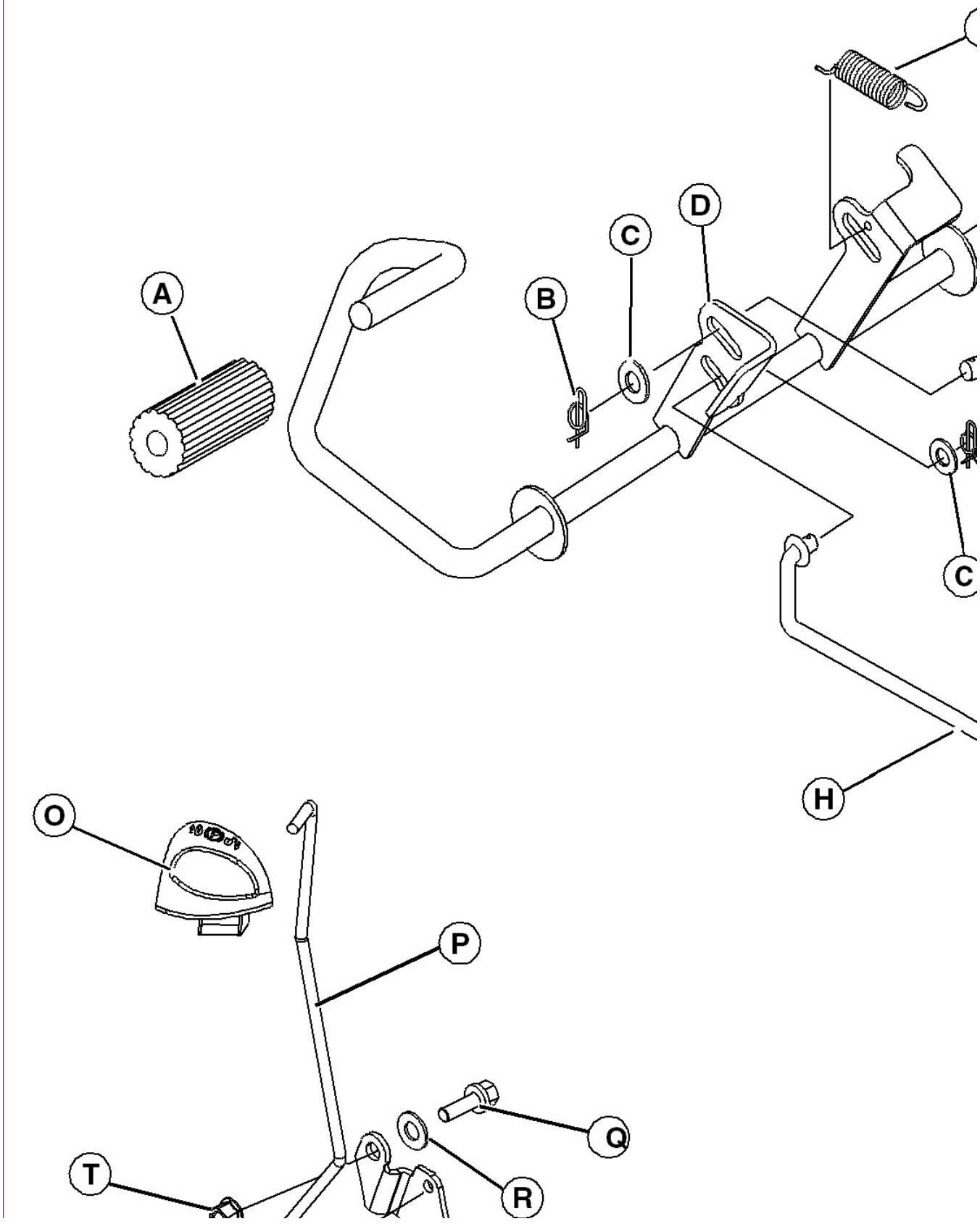

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LEGEND:

A - Pad
B - Spring Clip
C - Washer
D - Brake Pedal Assembly
E - Extension Spring
F - Rod
G - Bracket, Belt Idlers
H - Brake Rod
I - Spring Clip
J - Washer
K - Pivot
L - Compression Spring
M - Lock Nut
N - Park Brake Knob
O - Park Brake Rod
P - Bolt
Q - Spring Washer
R - Bracket
S - Lock Nut

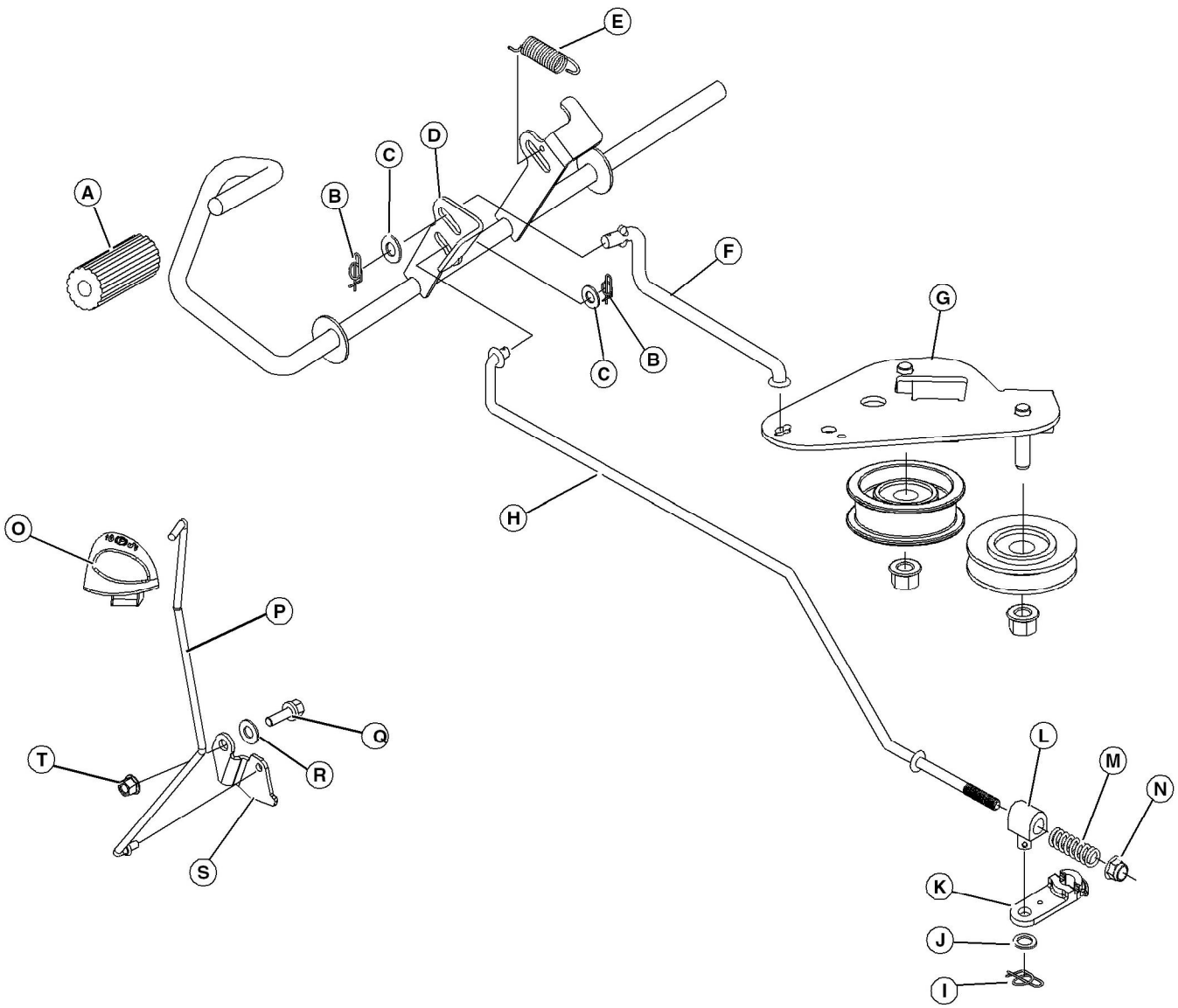

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Brake System - Hydro Transaxle


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LEGEND:

A - Pad
B - Spring Clip
C - Washer
D - Brake Pedal Assembly
E - Extension Spring
F - Rod
G - Bracket, Belt Idlers
H - Brake Rod
I - Spring Clip
J - Washer
K - Transmission Brake Lever
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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Park Brake Test

Park Brake Test

Reason:

To ensure park brake functions properly.

CAUTION:

Machine could become unstable. Operate on ramp only in first or second gear (low speed for hydro units). Shift to neutral to reduce the risk of personal injury.

Procedure:

- Climb 17 ramp during running start in 1st or 2nd gear (or slow speed for hydro units)
- Check park brake holds machine stationary

Test Drive:

CAUTION:

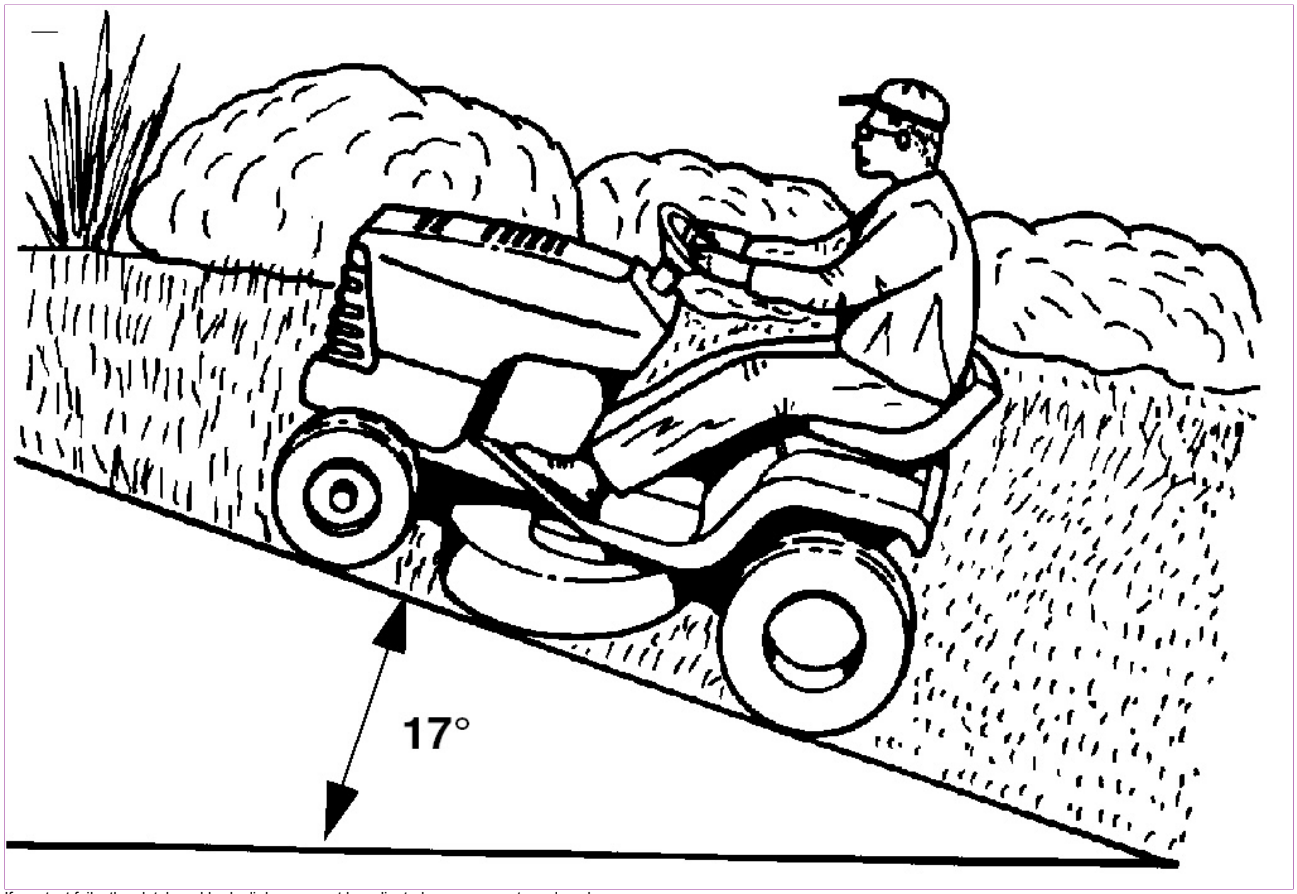
Help prevent severe bodily injury or death.

- ***Do not engage clutch/brake pedal too aggressively or machine may tip over backwards while performing the test drive on a 17 slope.***

  Install the mower deck for added stability.

1. Drive machine onto a 17 slope. Lock clutch/brake pedal in PARK position. Check that park brake holds machine stationary on slope and that machine does not creep downward once park brake is set.
2. If park brake test fails, inspect brake assembly components, replace as necessary. Repeat all adjustment procedures and drive tests.
3. **IMPORTANT:**

   Park brake must hold machine stationary on slope. Machine must not creep downward once park brake is set.



If any test fails, the clutch and brake linkages must be adjusted or components replaced.

NOTE:

For gear transaxle units, when the clutch/brake pedal is released and the traction drive system is engaged, there must be ample clearance between the friction pucks and the brake disc to prevent the disc brake from dragging. If brake drags, the disc brake will overheat and will also experience premature wear.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Test Drive

Test Drive

CAUTION:

Help prevent severe bodily injury or death. Do not engage clutch/brake pedal too aggressively when going in reverse or machine may tip over backwards.

1. Attach mower deck to machine, this will help stabilize the machine.
2. Drive machine on dry pavement in a safe, open, level area at fast idle in high gear. Apply “panic stop” force (no more than 50 pounds of force on gear models) to brake pedal - machine must stop within 1.52 M (5 ft) at full speed forward.
3. Repeat Steps 2 for reverse. Machine must stop within 0.76 M (2.5 ft) at full speed reverse.
4. If machine fails test, inspect brake assembly components, replace as necessary. Repeat all adjustment procedures and drive tests.

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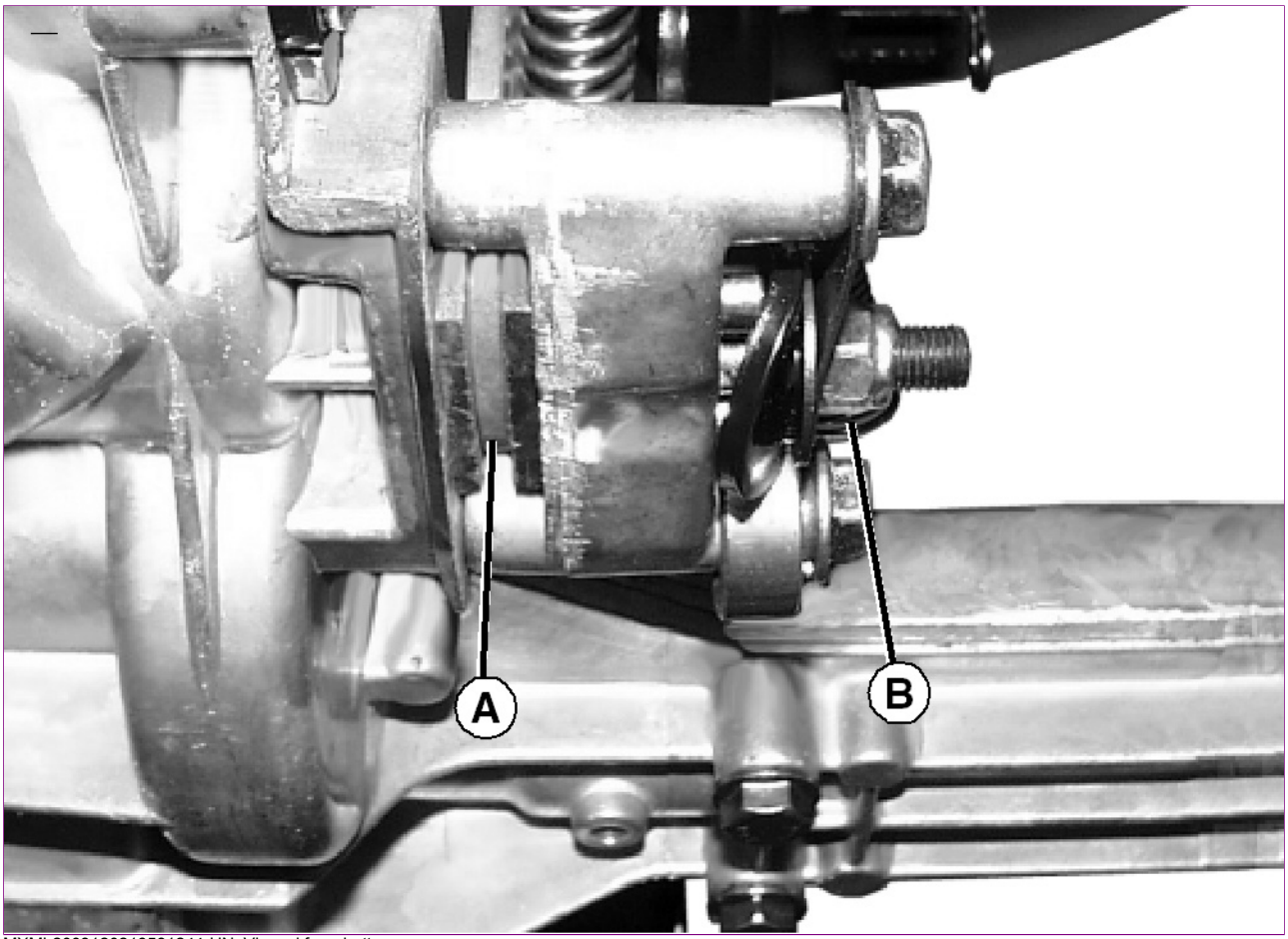
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake Adjustment - Gear

Brake Adjustment - Gear

Procedure:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Block front wheels to prevent machine from moving.
3. *NOTE:*

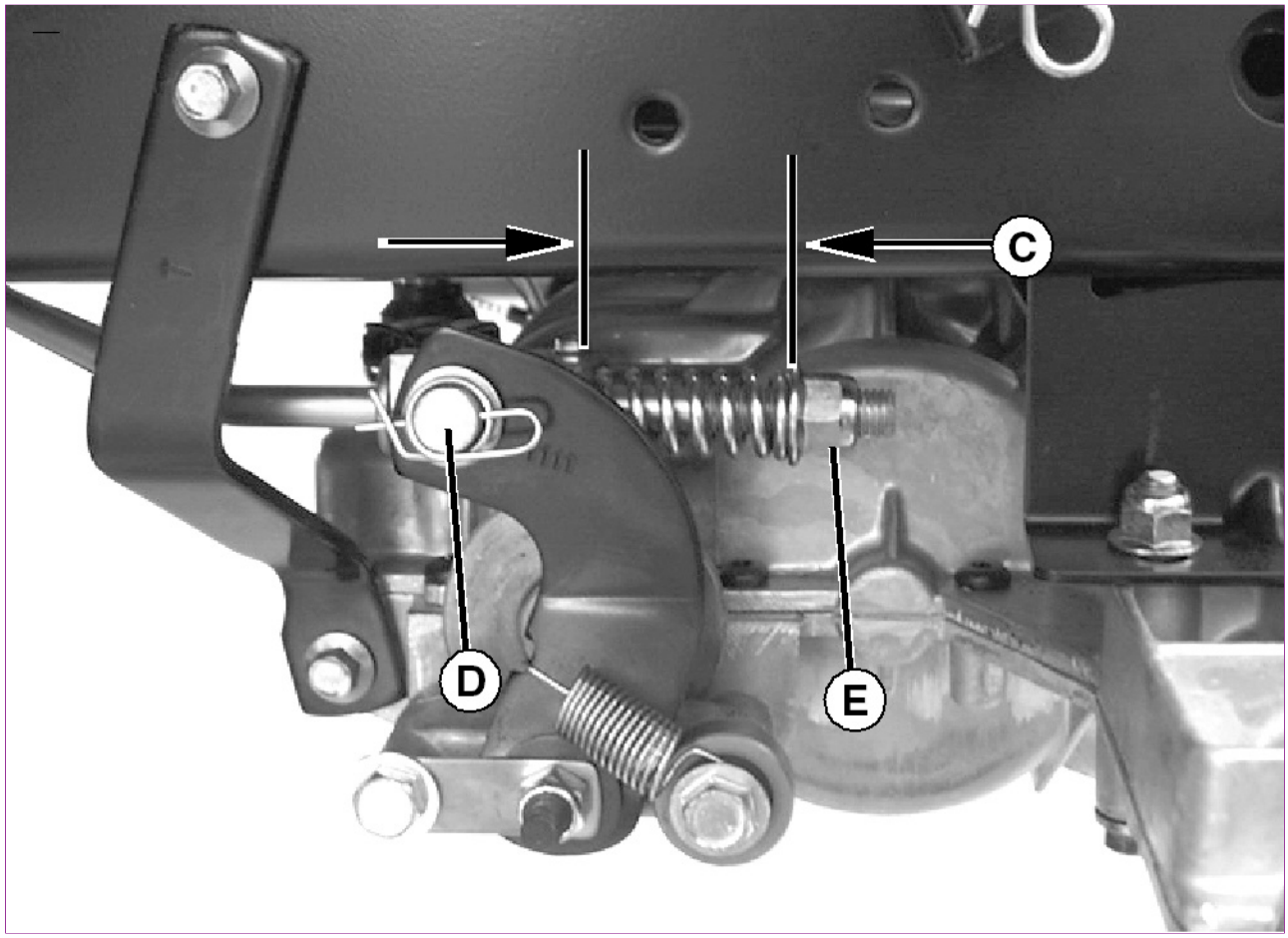
   These adjustment procedures can be performed with machine on the floor; however, you may want to remove the left rear wheel for easier access.



MXML2008120216581244-UN: Viewed from bottom.

With park brake released, measure brake disc (A) to brake puck gap. Adjust lock nut (B) to change gap if not to specification.

4. Lock park brake.



5. Measure the length (C) of the compression spring from the pivot trunnion (D) to the flange nut (E).
6. If not to specifications, release brake and adjust flange nut.
7. Repeat steps 4 to 6 until specified measurement is obtained when brake is applied.

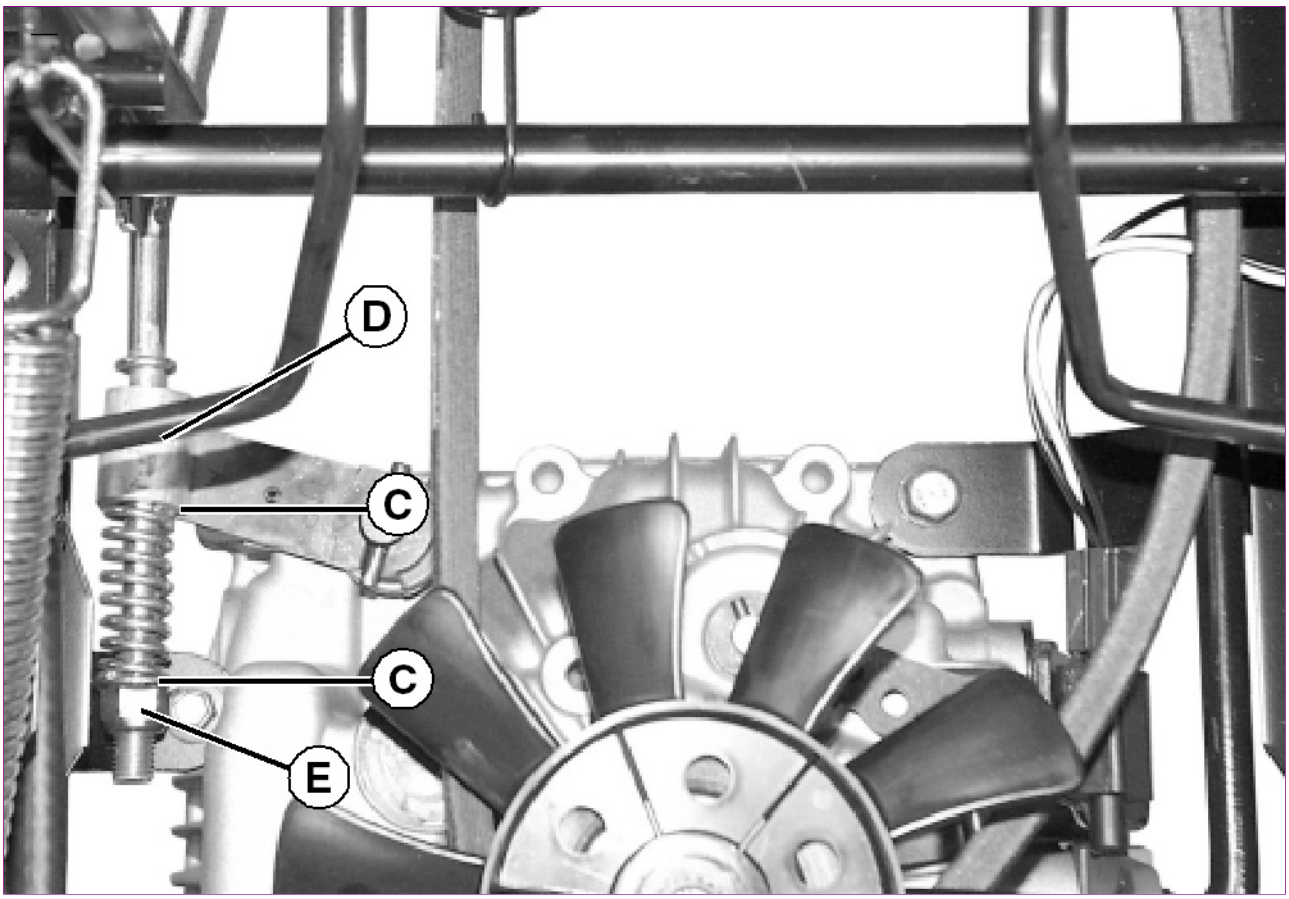
Item	Measurement	Specification
Specification:		
Brake Disc to Puck Gap		0.25 mm (0.01 in.)
Spring Length		35 - 46 mm 1.38 - 1.81 in.)
Nominal Spring Length		44 mm 1.73 in.)

Brake Adjustment - Hydro

Procedure:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Block front wheels to prevent machine from moving.
3. *NOTE:*

   These adjustment procedures can be performed with machine on the floor; however, you should remove the left rear wheel for for access.

   Lock park brake.
4. 

   MXML2008120216581246-19: Shown with fenderdeck removed for clarity

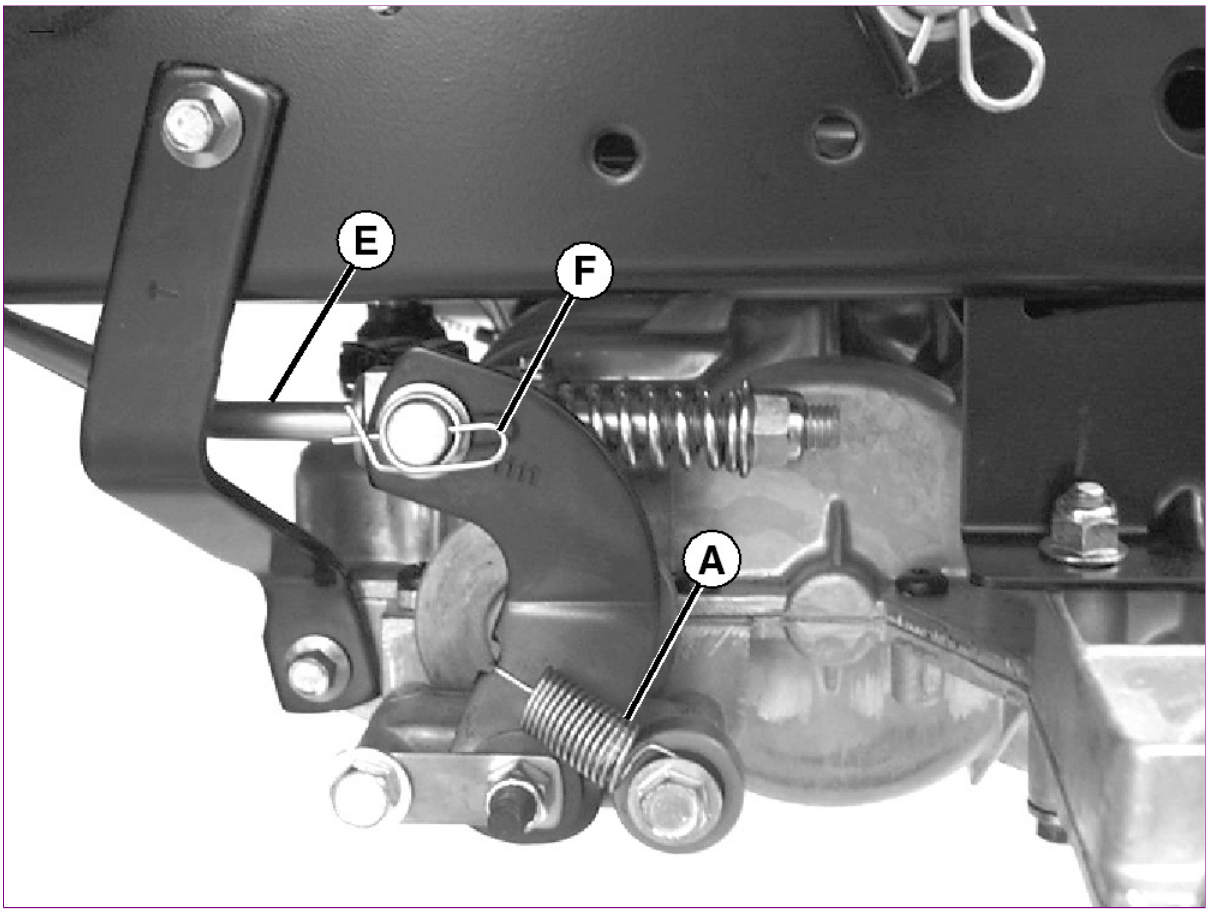
   Measure the length (C) of the compression spring from the pivot trunnion (D) to the flange nut (E).
5. If not to specifications, release brake and adjust flange nut.
6. Repeat steps 3 to 5 until specified measurement is obtained when brake is applied.

Item	Measurement	Specification
Specification:		
Spring Length		35 - 46 mm 1.38 - 1.81 in.)
Nominal Spring Length		44 mm 1.73 in.)

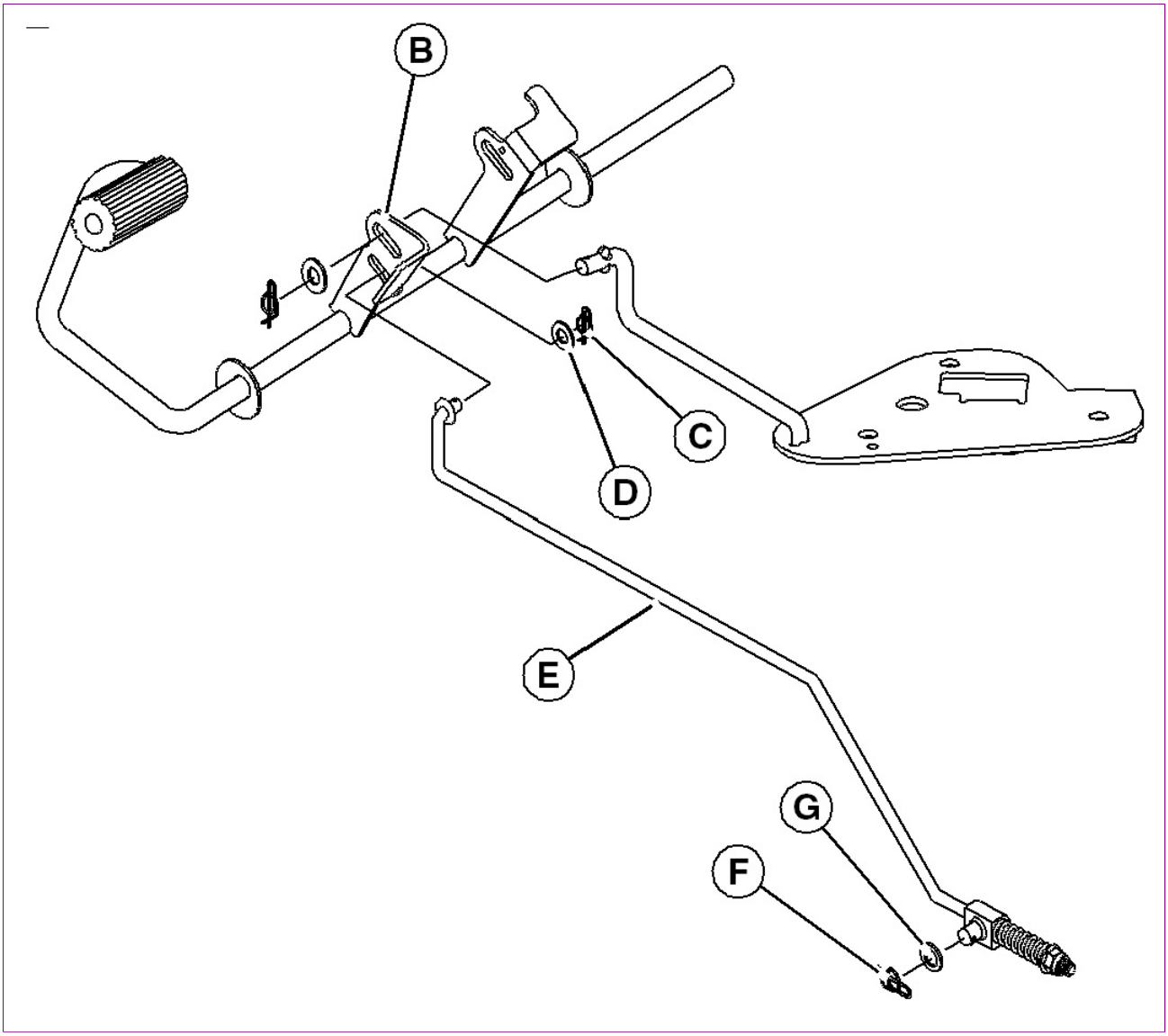
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake Linkage Removal and Installation - Gear

Brake Linkage Removal and Installation - Gear

Removal:

1. Lift and support rear wheels.
2. Release park brake if engaged.
3. 

Disconnect return spring (A) from transaxle brake lever.



4. Remove spring clip (F) and washer (G) holding brake rod (E) onto transaxle brake arm.
5. Remove spring clip (C), and washer (D) from brake pedal arm (B).
6. Lower brake rod assembly from machine frame. Inspect parts for wear or damage. Replace parts as necessary.

Installation:

1. *NOTE:*

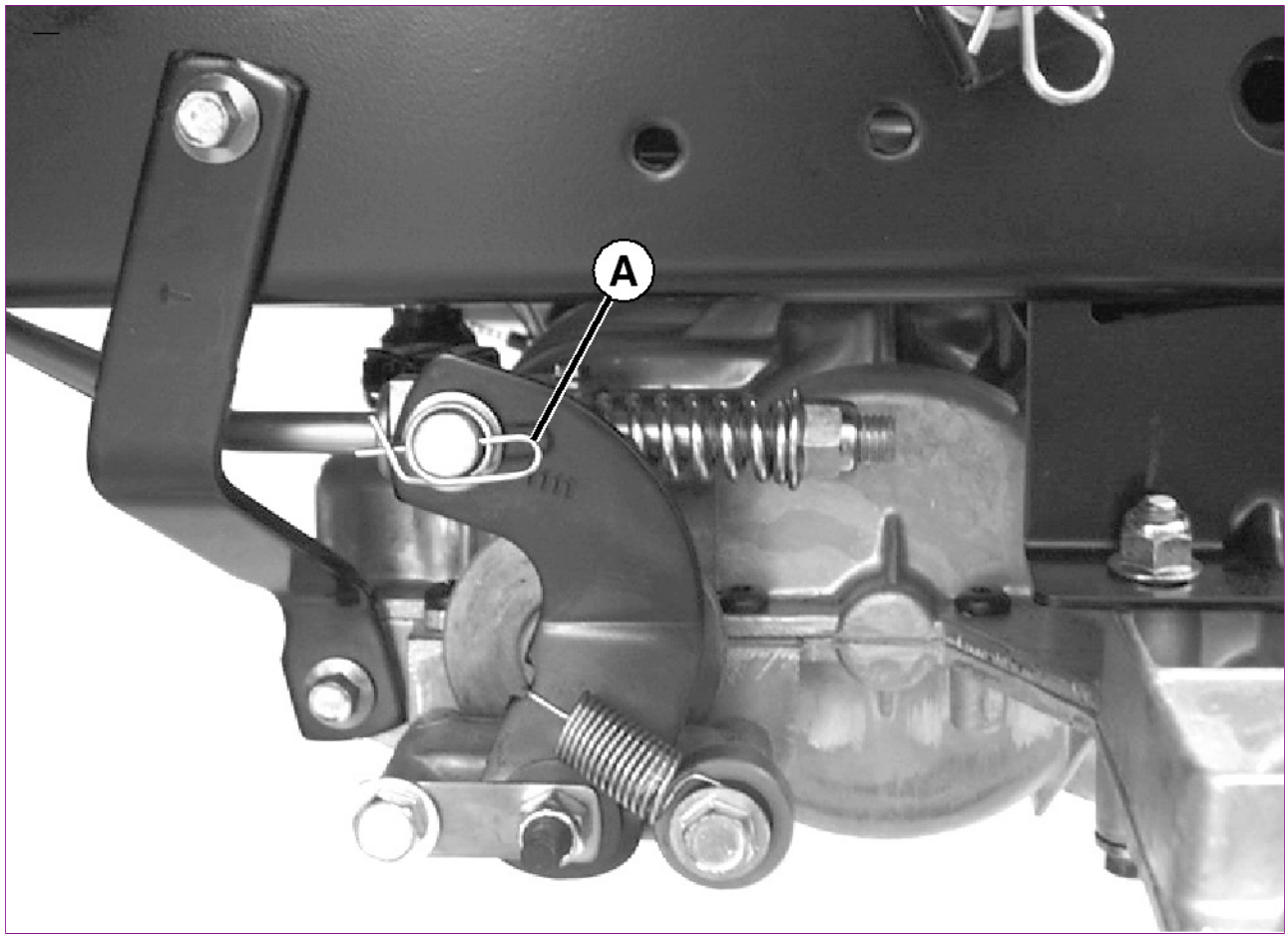
   Position assembly before installing any fasteners.

   Install brake rod onto brake pedal arm. Secure with washer (D) and spring clip (C).
2. Install rod end into brake arm (F). Secure with washer (G) and spring clip (F).
3. Connect return spring (A).
4. Adjust brakes. See Brake Adjustment - Gear .

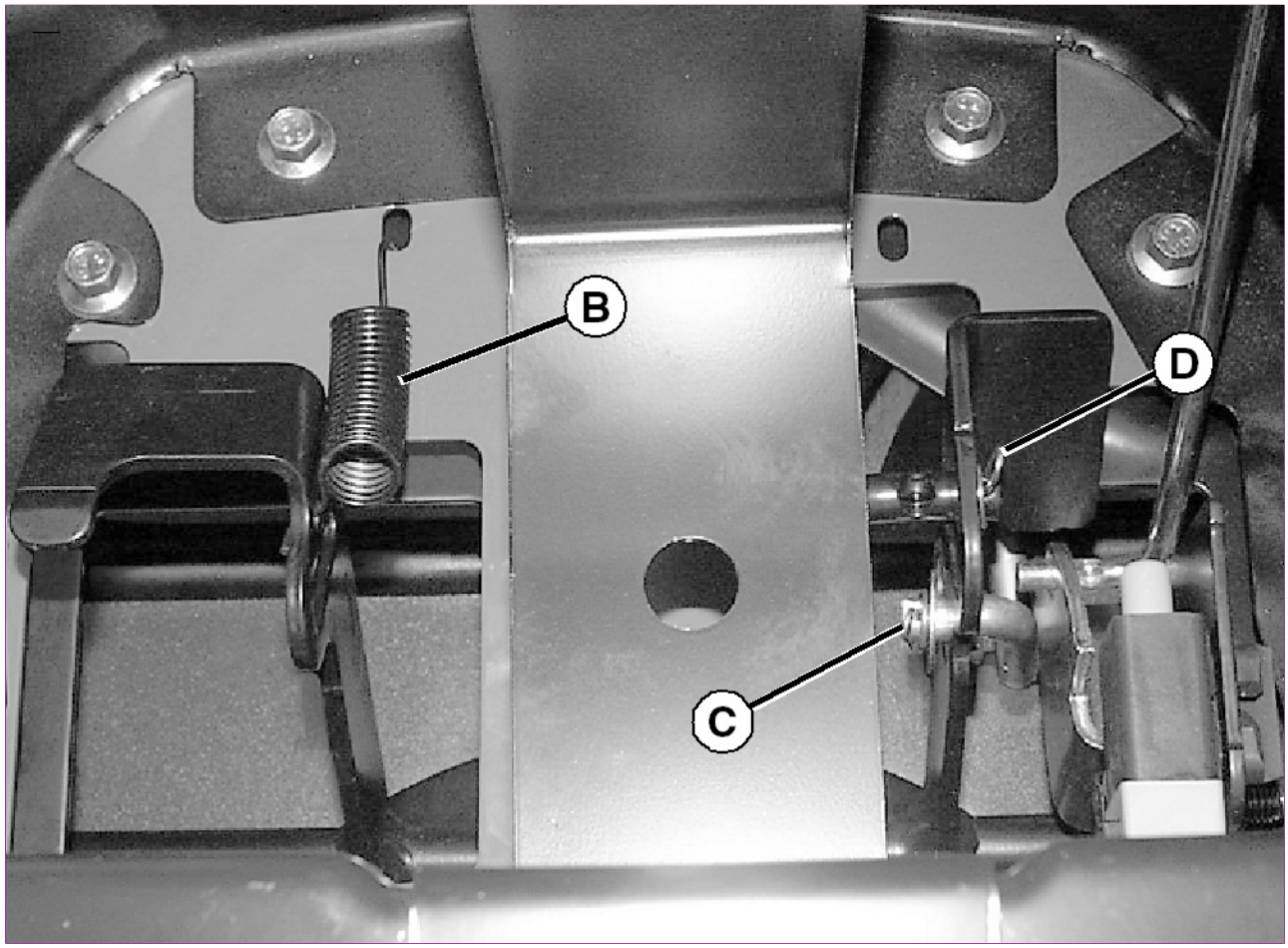
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake Pedal Assembly Removal and Installation - Gear

Brake Pedal Assembly Removal and Installation - Gear

Removal:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Remove mower deck. See Removing Mower Deck in the Attachments section.
3. Release park brake is engaged.
4. 

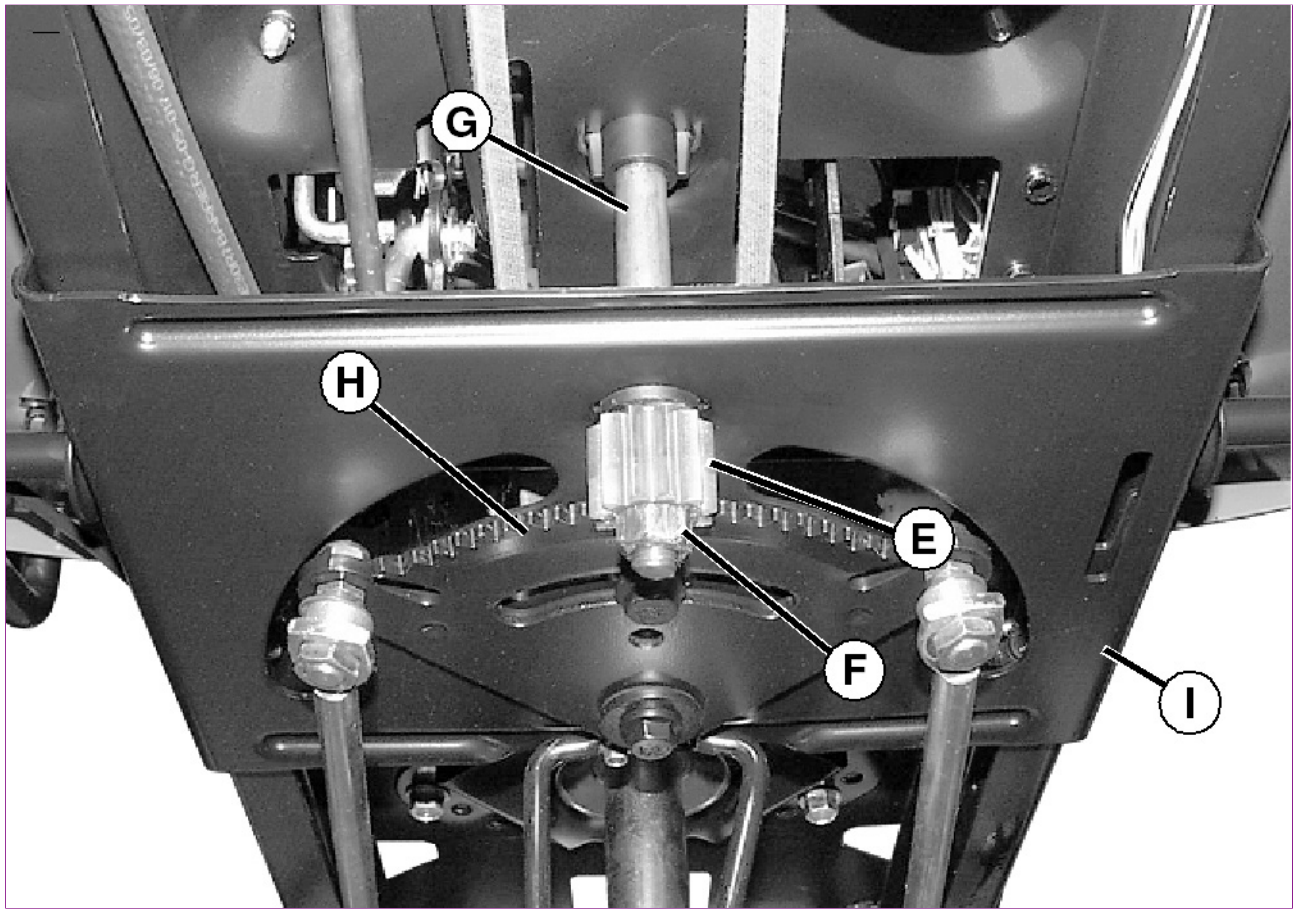
Remove spring clip (A) and washer from rear of brake rod. Disconnect rod from transaxle brake lever.
5. Remove battery and battery bracket.

6. 

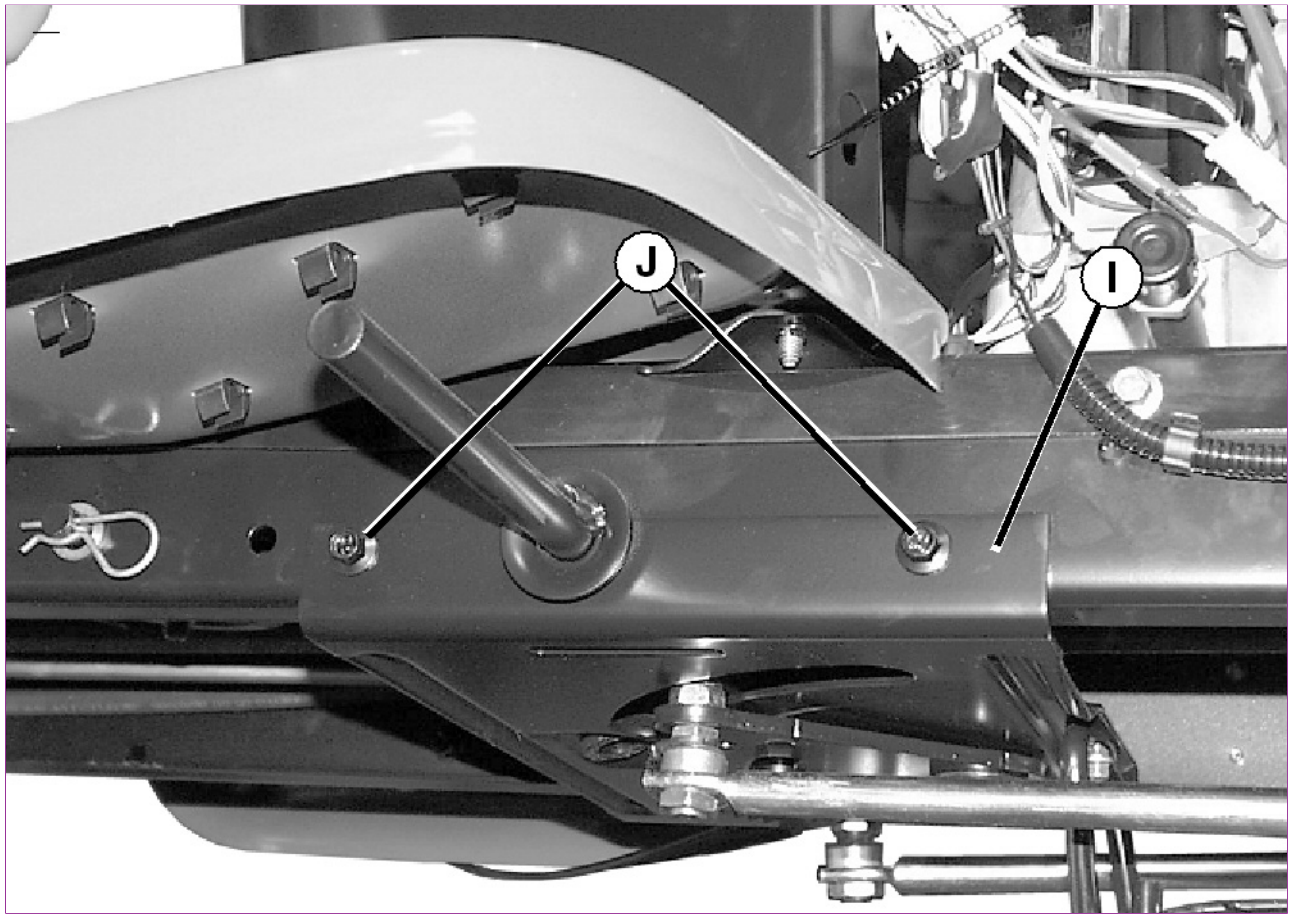
Remove spring (B) from fender deck and brake pedal assembly.
7. *NOTE:*

If spring clips can not be easily removed, remove them after lowering the steering plate in the next steps.

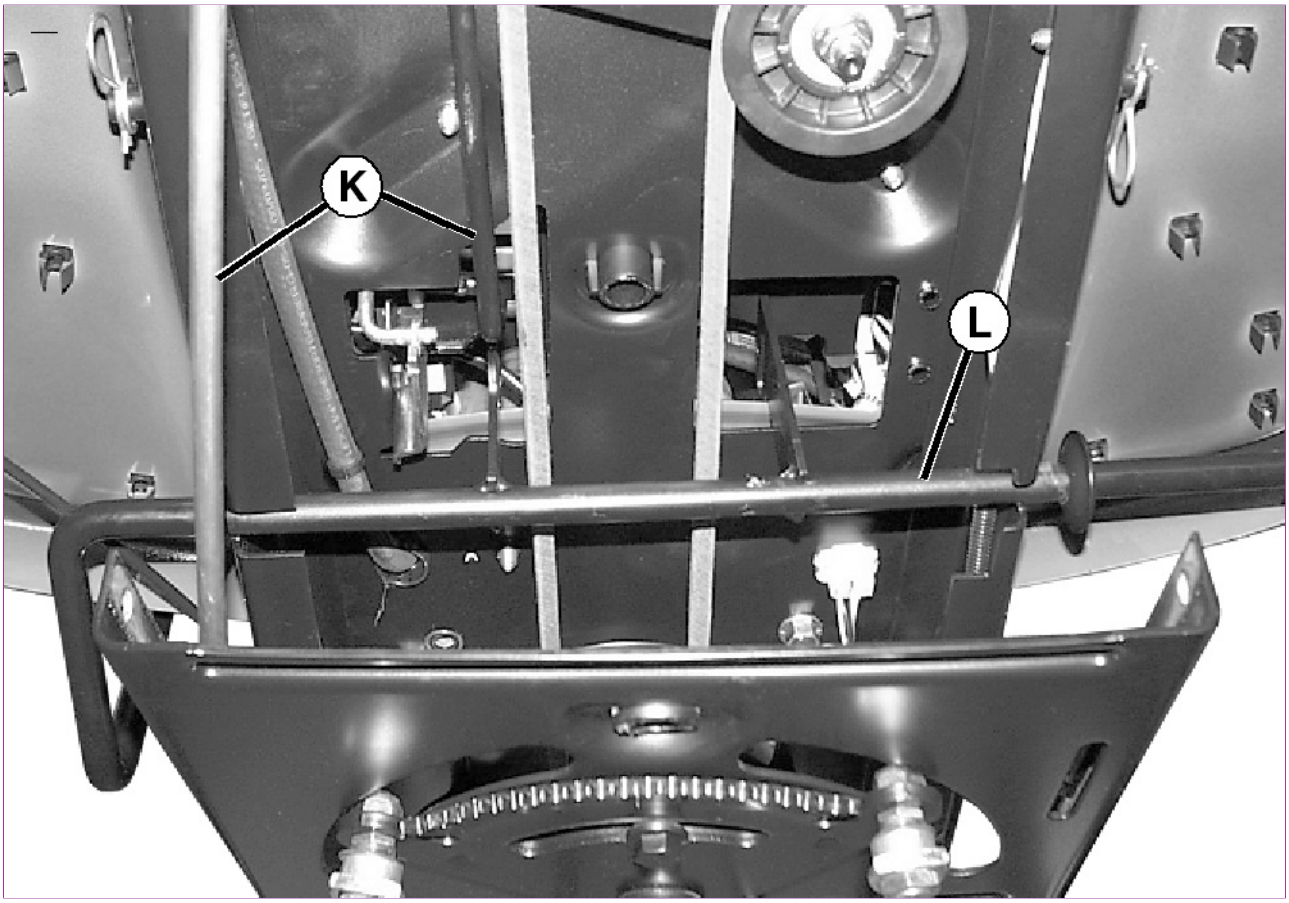
Remove spring clips (C and D) and two washers from brake rods.

8. 

Remove nut (F) and pinion gear (E).
9. Raise steering shaft (G) enough to clear sector gear (H) and plate (I).

10. 

Remove screws (J) from plate (I) on both sides of machine.

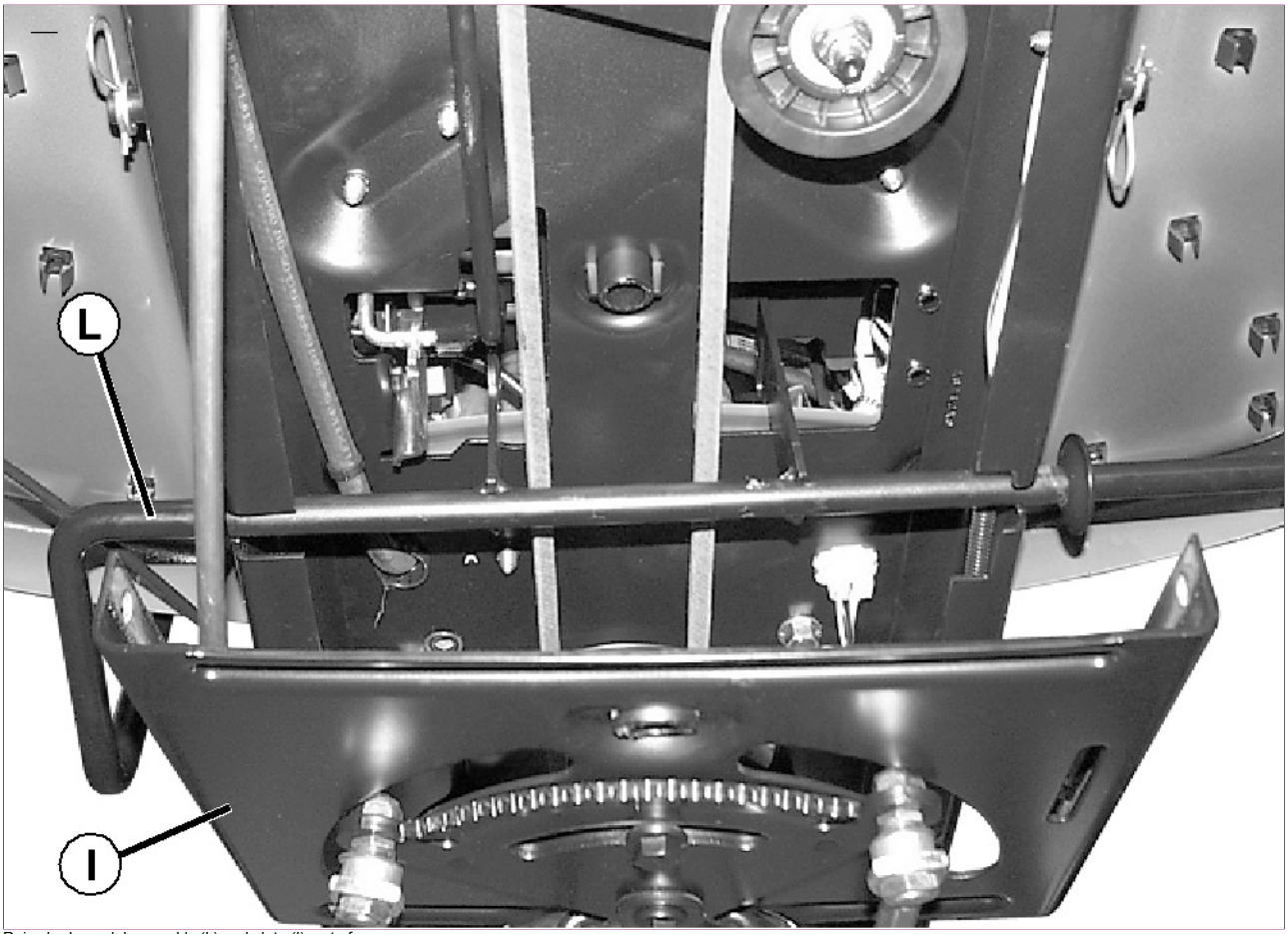
11. 

    If not already done, remove spring clip and washer from rods (K).
12. Lower the brake pedal (L) and remove pedal from machine.
13. Inspect brake rods and pedal for damage. Replace as necessary.

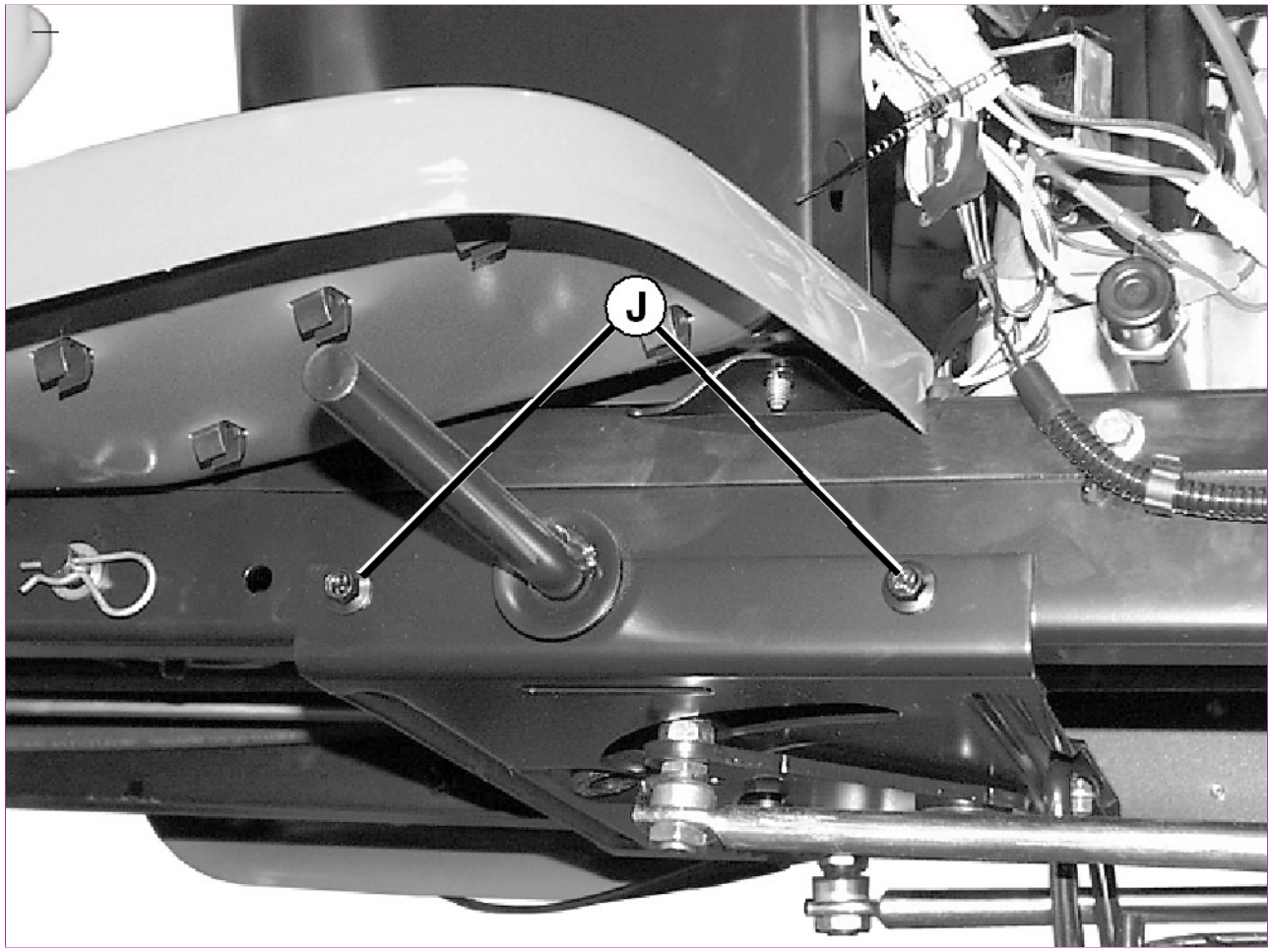
Installation:

1. *NOTE:*

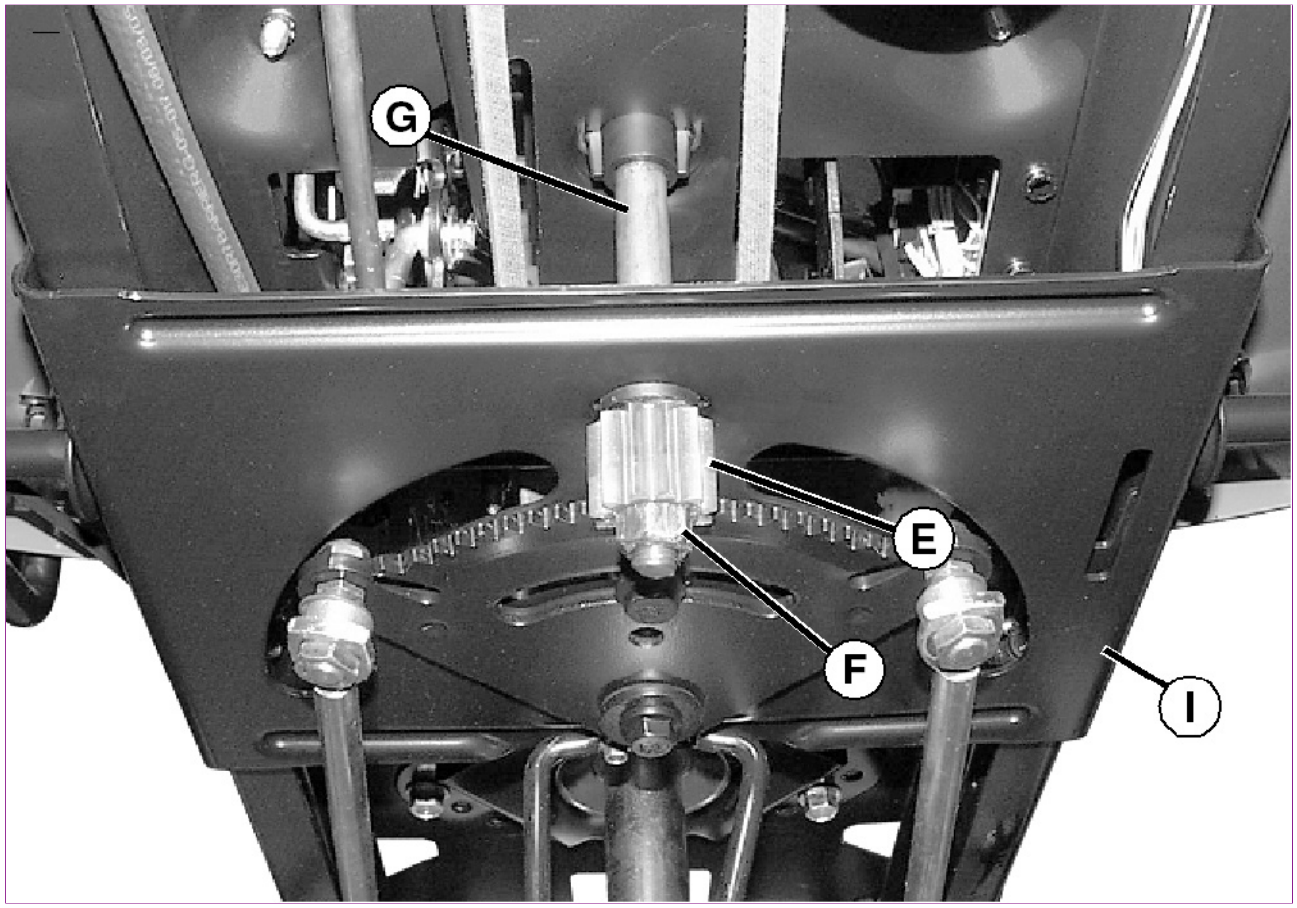
   It may be easier to install brake rod and retain with washers and spring clips before raising plate (I).



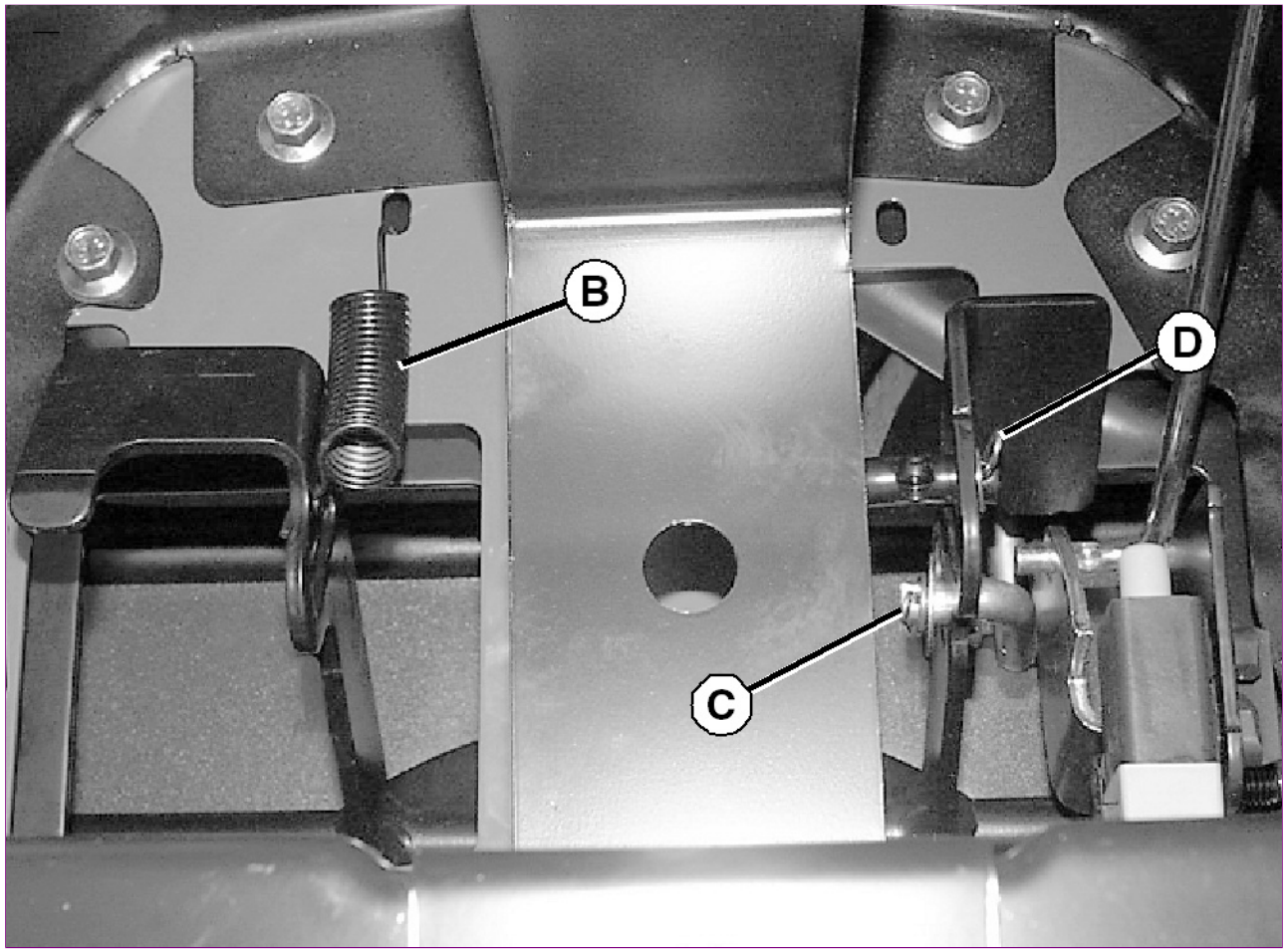
Raise brake pedal assembly (L) and plate (I) up to frame.

2. 

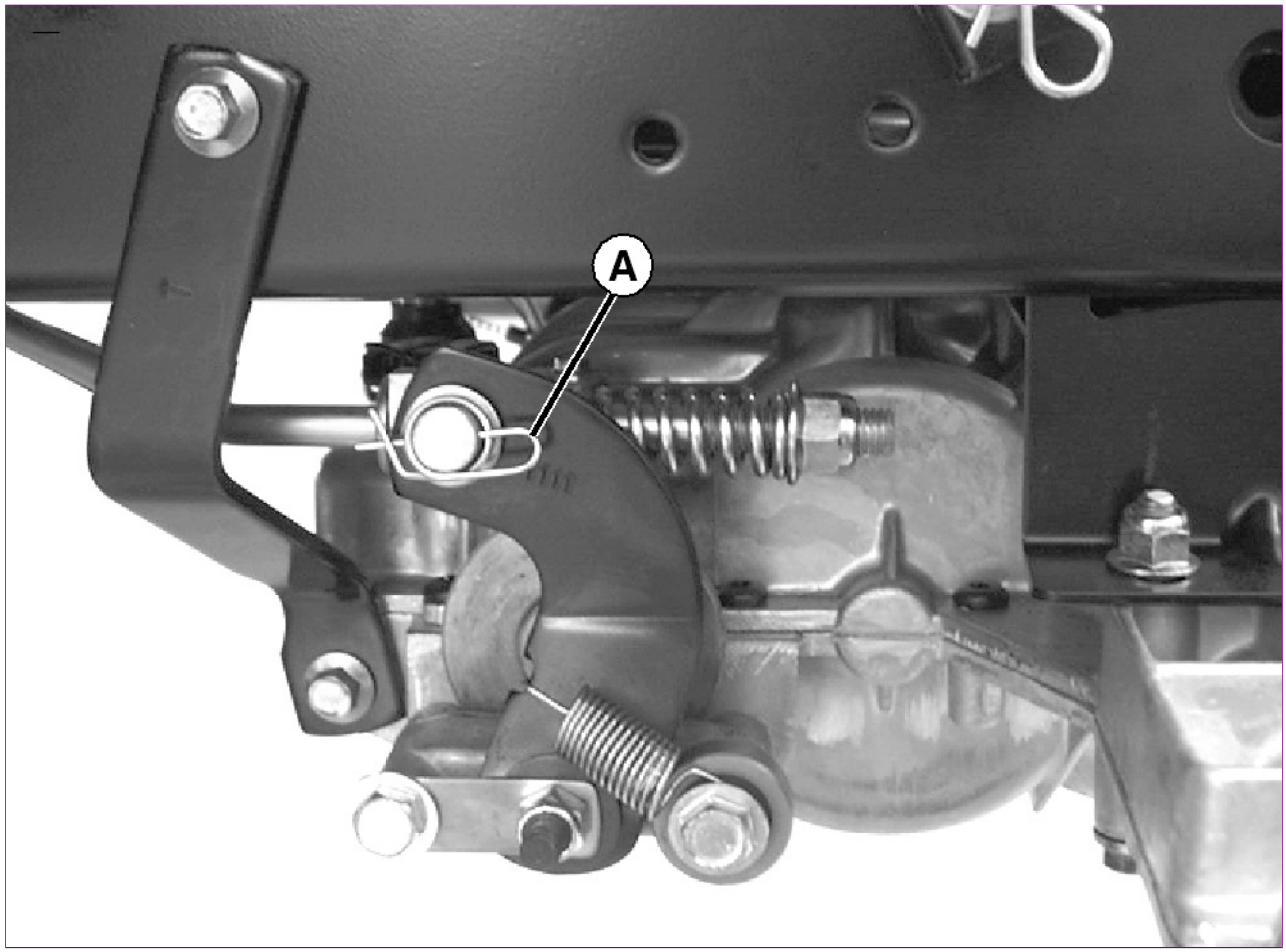
Secure plate on both sides of machine frame with screws (J).

3. 

Lower steering shaft (G) through plate (I). Check that steering shaft bushing are fully seated in frame and plate holes.
4. Install pinion gear (E) and nut (F).

5. 

Install spring (B) onto fender deck and brake pedal assembly.
6. If not already done, install brake rods into brake shaft bracket and secure with washers and spring clips (C and D).

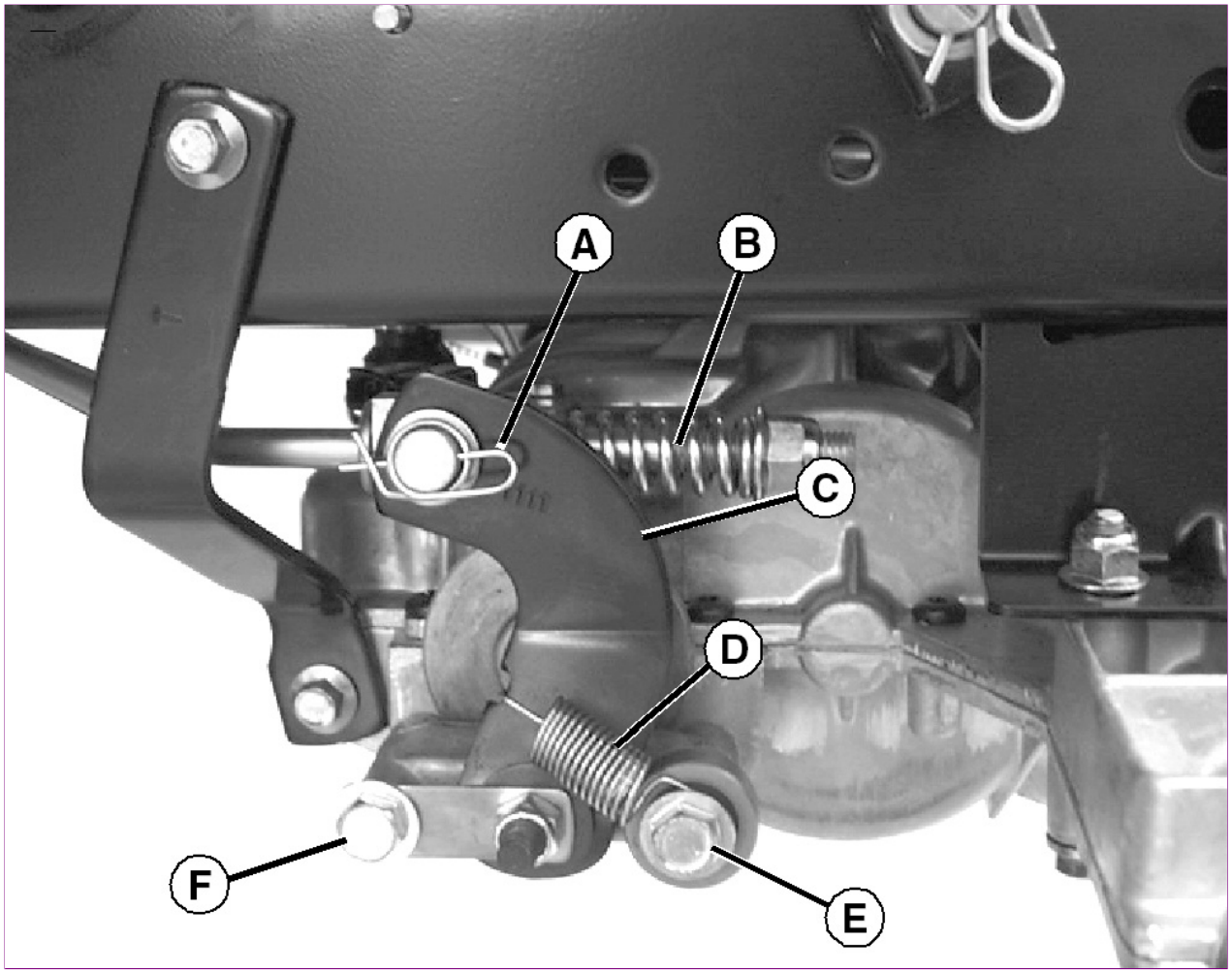
7. 

   Connect brake rod to transaxle brake lever with washer and spring clip (A).
8. Install battery bracket and battery.
9. Install mower deck. See Installing Mower Deck in the Attachments section.

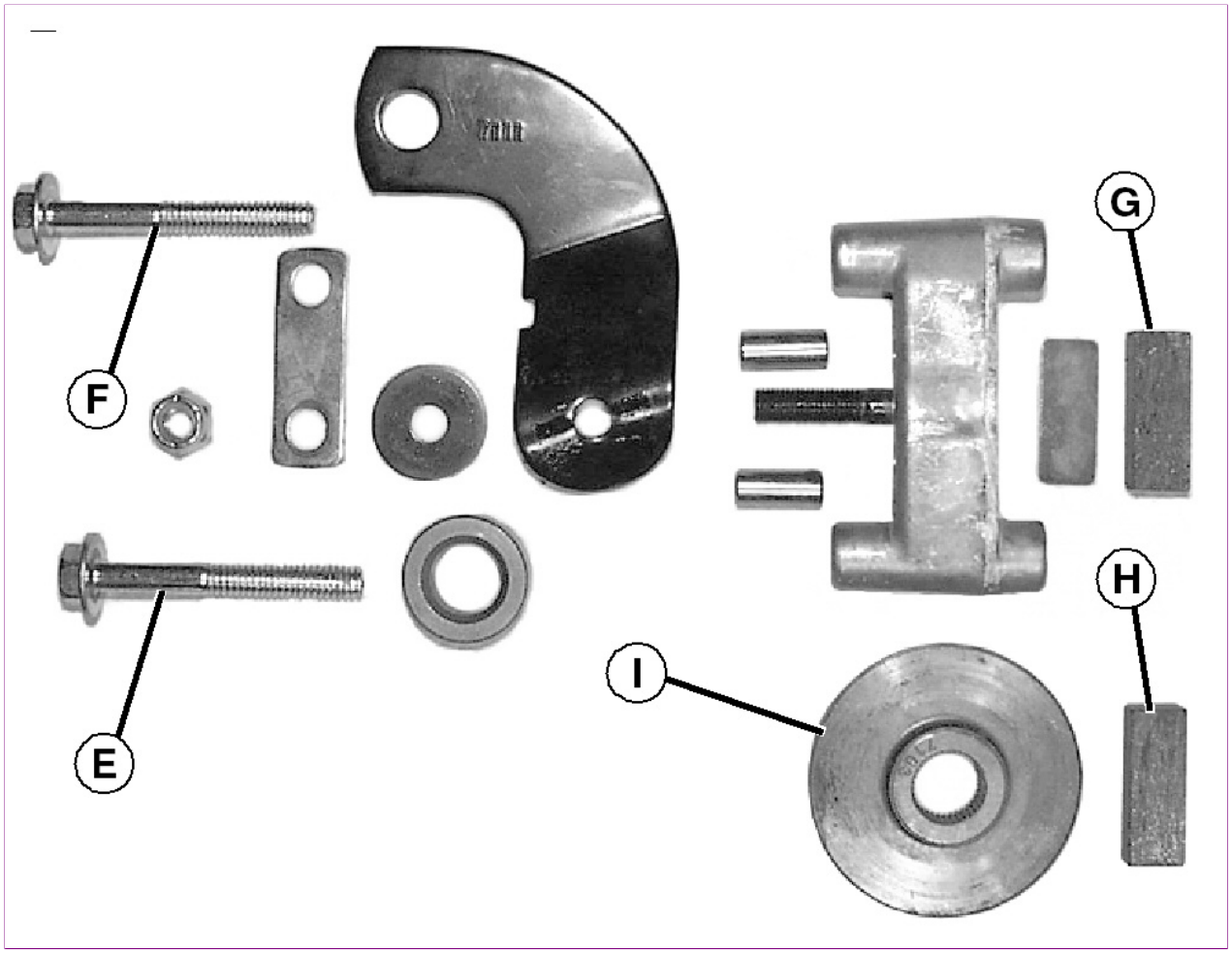
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake Removal and Installation - Gear

Brake Removal and Installation - Gear

Removal:

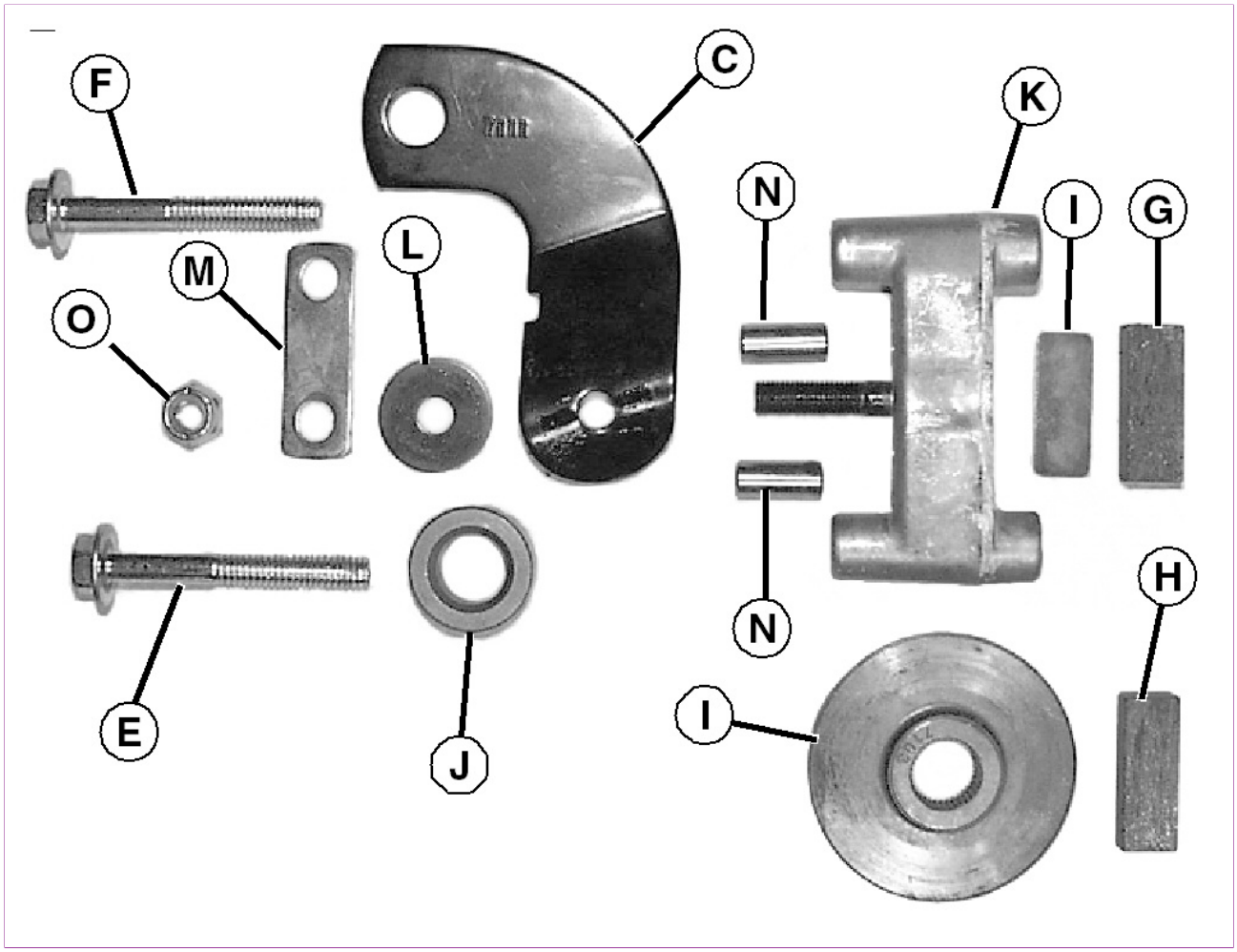
1. Lift and support rear of machine.
2. Remove left rear wheel.
3. Release park brake if engaged.
4. 

Remove spring clip (A).
5. Remove cotter pin and washer. Disconnect brake rod assembly (B) from brake lever (C).
6. Unhook and remove return spring (D).
7. Remove cap screws (E and F) and brake assembly.

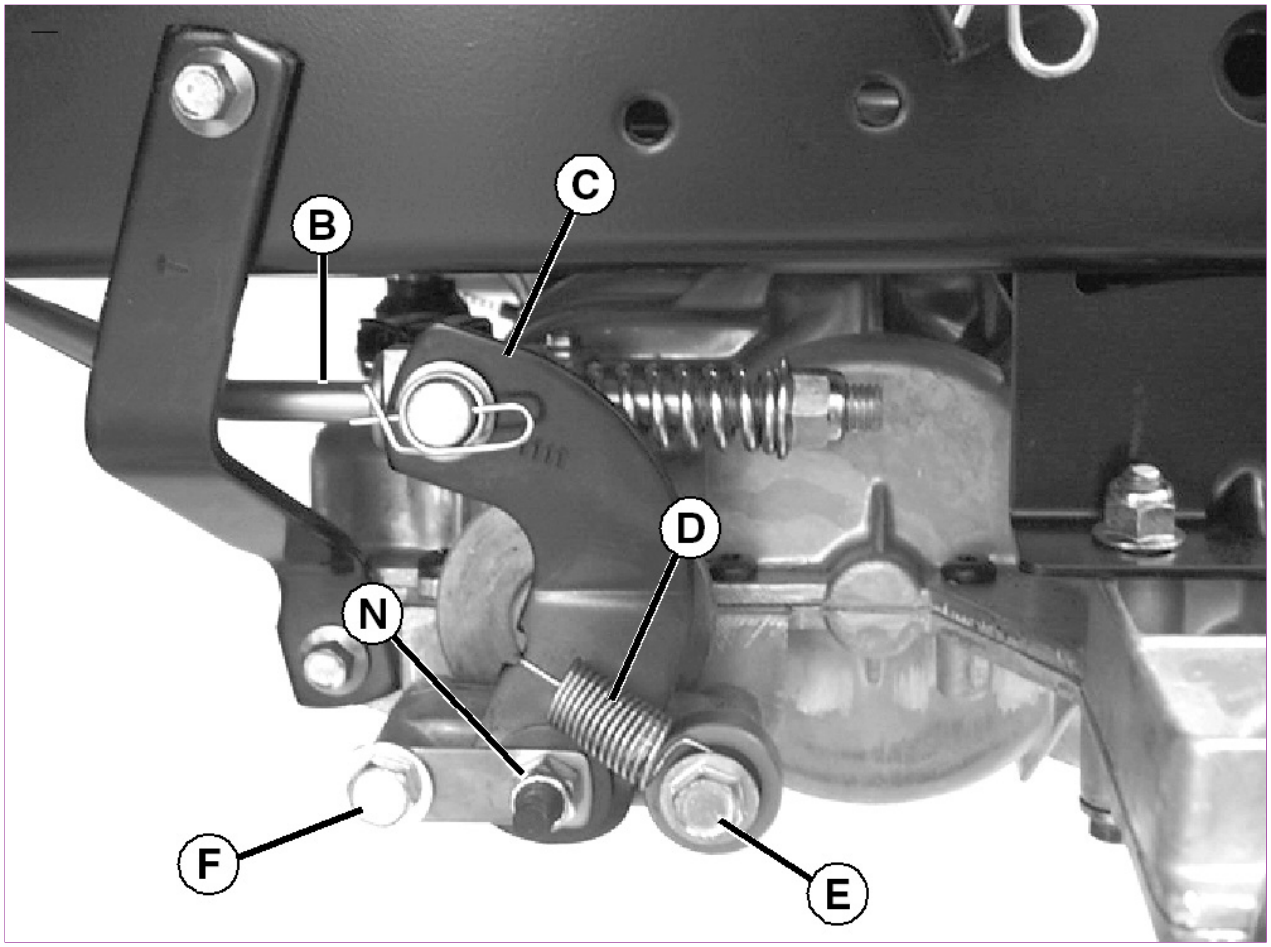


8. Replace the friction pucks (G, H) (as a set only) and the brake disc (I) anytime transaxle is disassembled.
9. Inspect remaining components for wear or damage. Replace components as necessary.

Installation:



1. Install friction puck (H) in the transaxle case recess.
2. Install brake disc (I) with hub outward.
3. Install spacer (J) over right lip of mounting bracket (K).
4. Install cap screw (E) and in right mounting bracket hole.
5. Install brake lever (C), washer (L), bracket (M), and lock nut (O) on mounting bracket center stud.
6. Install cap screw (F) in left hole of mounting bracket (C).
7. Coat dowel pins (N) with John Deere Never-Seez®. Install dowel pins inside two center holes of mounting bracket (K).
8. Install striker plate (I) and friction puck (G) in backside recess of mounting bracket.
9. Install complete brake assembly to transaxle.



10. Tighten cap screws (E and F) to **20 N•m (180 lb-in.)** .
11. *NOTE:*

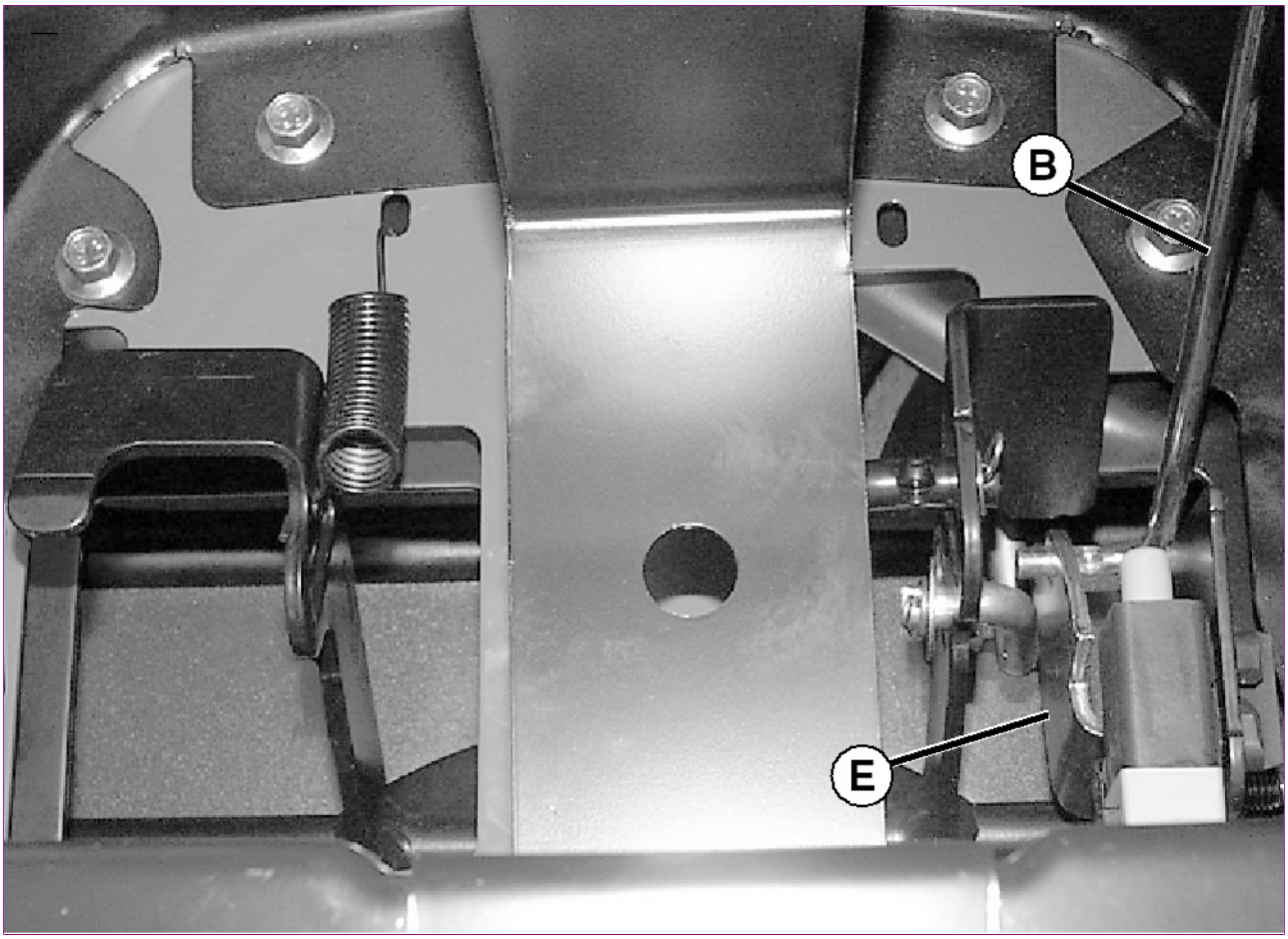
    To get initial setting for measurement, tighten locking nut (N) to 4.5 N•m (40 lb-in.) and then loosen nut 1/2 turn.

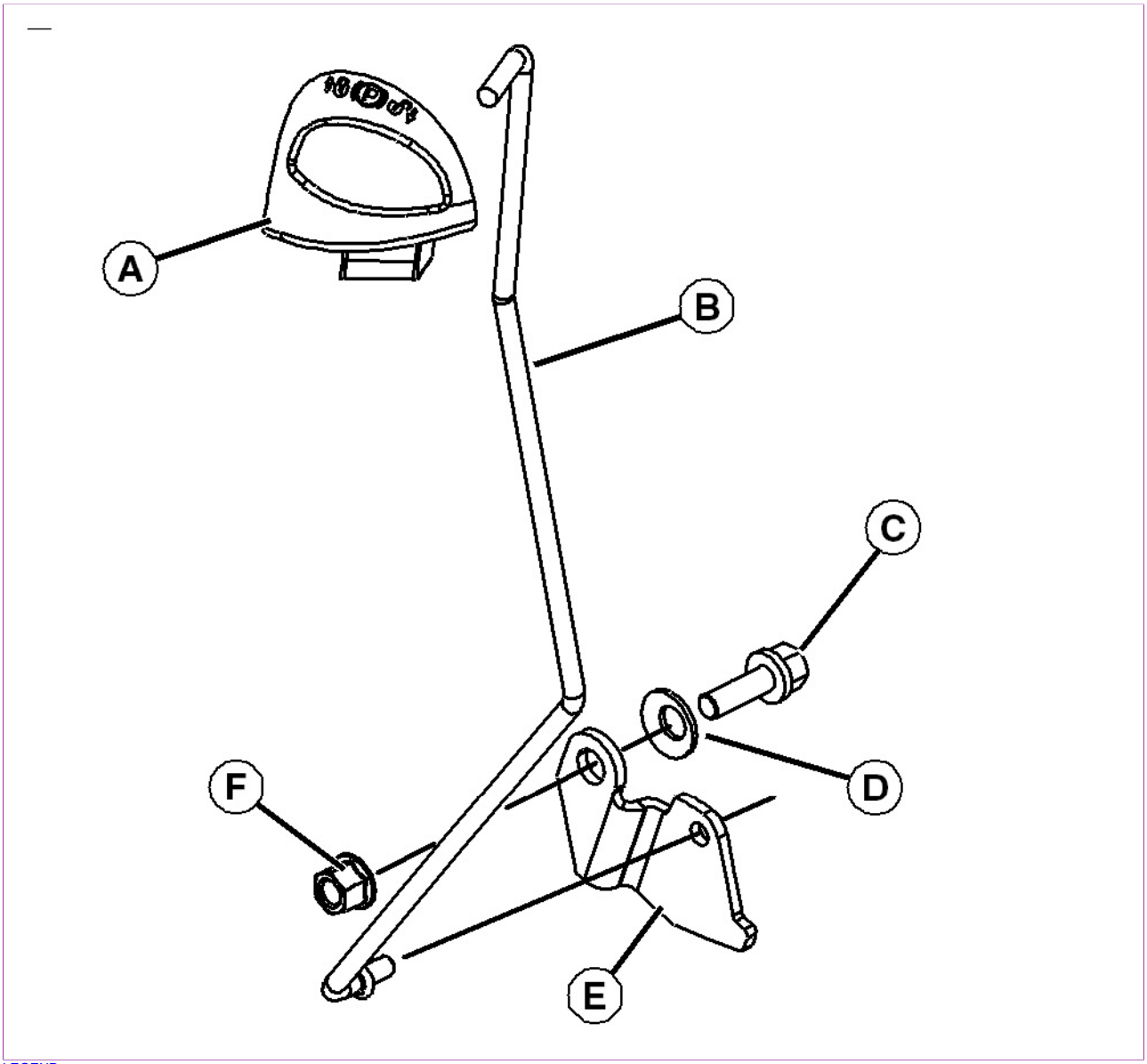
    Tighten lock nut (N) until there is a **0.25 mm (0.010 in.)** air gap between outer friction puck and brake disc.
12. Install return spring (D).
13. Install brake rod (B) to brake arm (C). Secure with washer and spring clip.
14. Check that brake is not dragging. See Brake Adjustment - Gear .

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Park Brake Lever and Linkage

Park Brake Lever and Linkage

Removal:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Remove hood. See Hood Removal and Installation in the Miscellaneous section.
3. Remove battery and battery bracket.
4. 



LEGEND:

A - Parking Brake Handle
B - Parking Brake Rod
C - Shoulder Bolt
D - Spring Washer
E - Bracket, Parking Brake
F - Locking Nut

Remove parking brake rod (B) from parking brake handle (A).

5. Remove nut (F), shoulder bolt (C), and spring washer (D) holding parking brake bracket (E) to frame (G).

Installation:

1. *NOTE:*

   Install the spring washer (D) with the cupped side toward the bracket.

Attach parking brake bracket (E) to frame with shoulder bolt (C), spring washer (D) and nut (F).

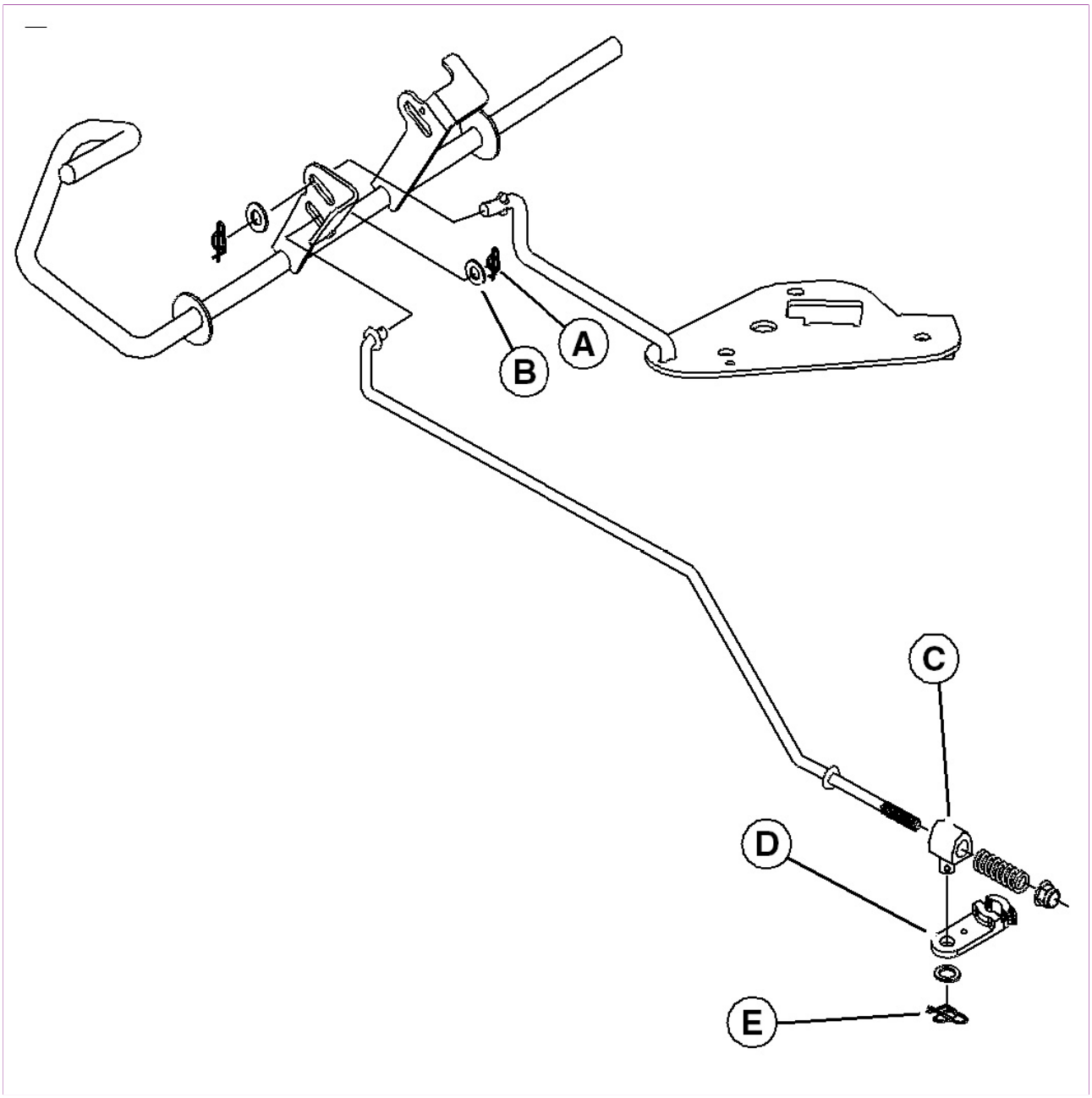
2. If removed, install parking brake rod (B) into parking brake bracket (E).
3. Push parking brake rod (B) back onto parking brake handle (A).

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake Linkage Removal and Installation - Hydro

Brake Linkage Removal and Installation - Hydro

Removal:

1. Lift and support rear wheels.



2. Remove spring clip (E) holding rod pivot (C) onto brake arm (D).
3. Remove spring clip (A) and washer (B).
4. *NOTE:*

   Internal transaxle brake components are not serviceable. If the brake system does not function properly after brake adjustment, replace transaxle.

   Remove the brake rod from machine. Inspect parts for wear or damage. Replace parts as necessary.

Installation:

1. *NOTE:*

   Position brake rod before installing any fasteners.

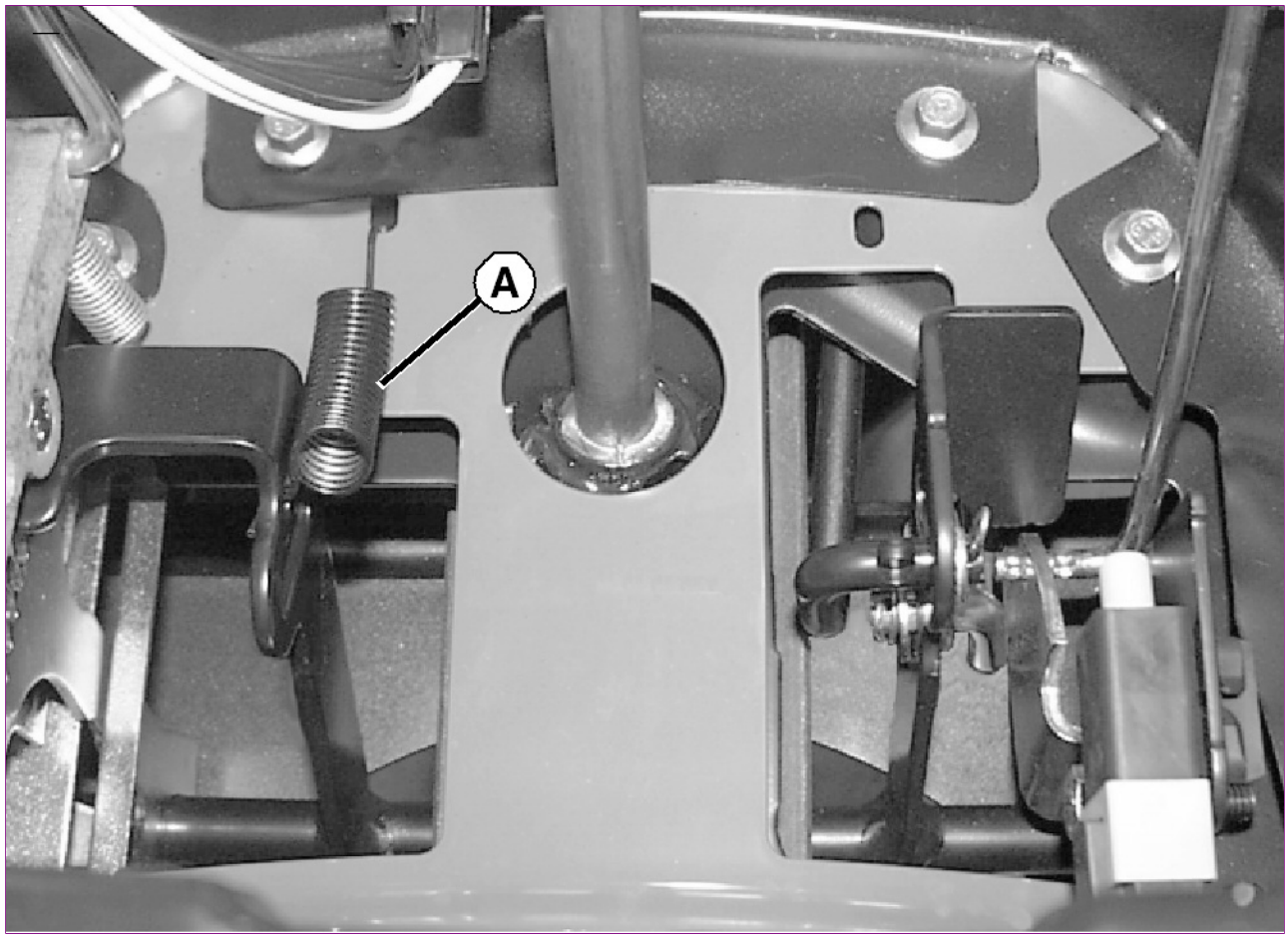
Install brake rod and brake. Secure with washer (B) and spring pin (A).
2. Install pivot (C) into brake arm (D). Install washer and secure with spring pin (E).
3. Adjust brake. See Brake Adjustment - Hydro .

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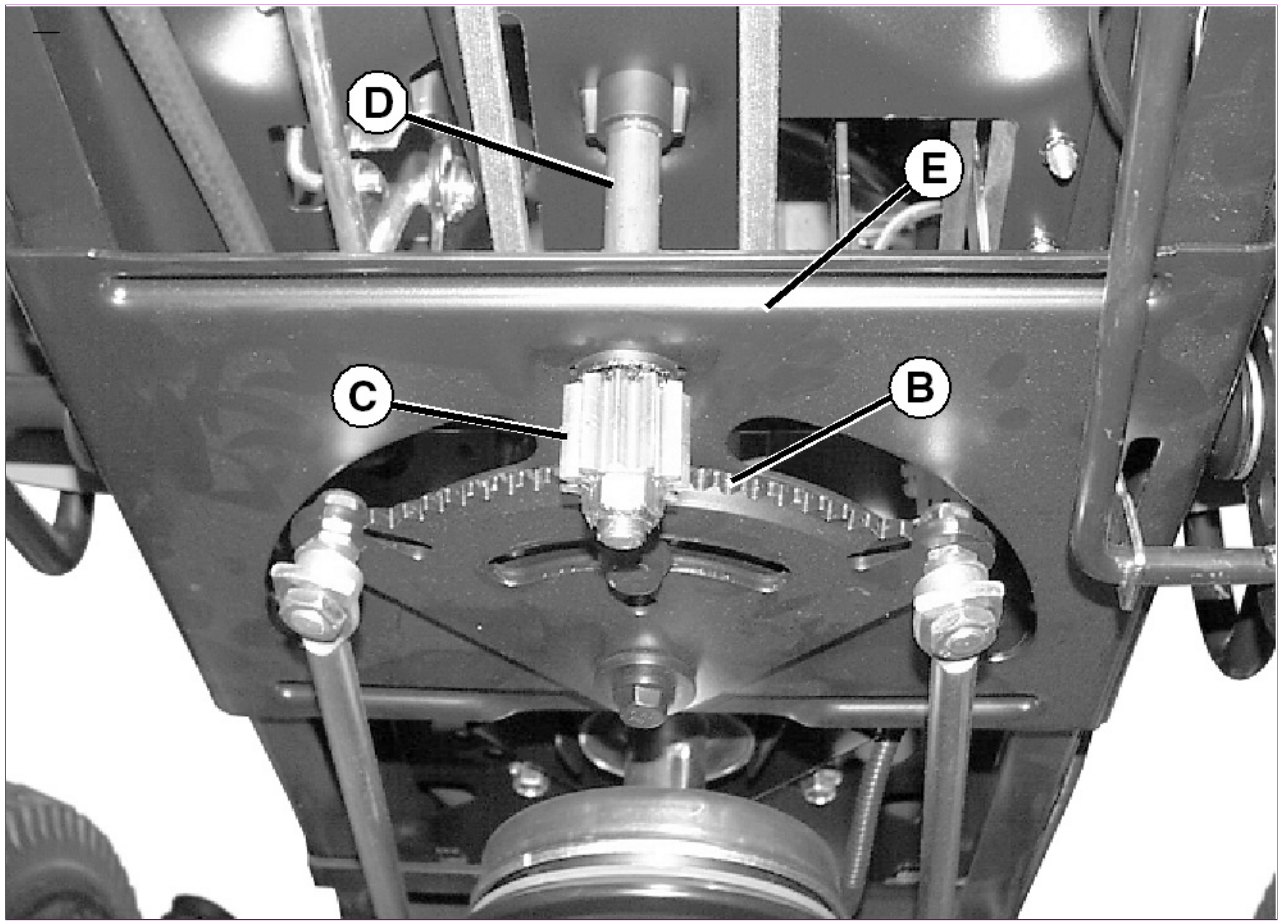
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Brake Pedal Assembly Removal and Installation - Hydro

Brake Pedal Assembly Removal and Installation - Hydro

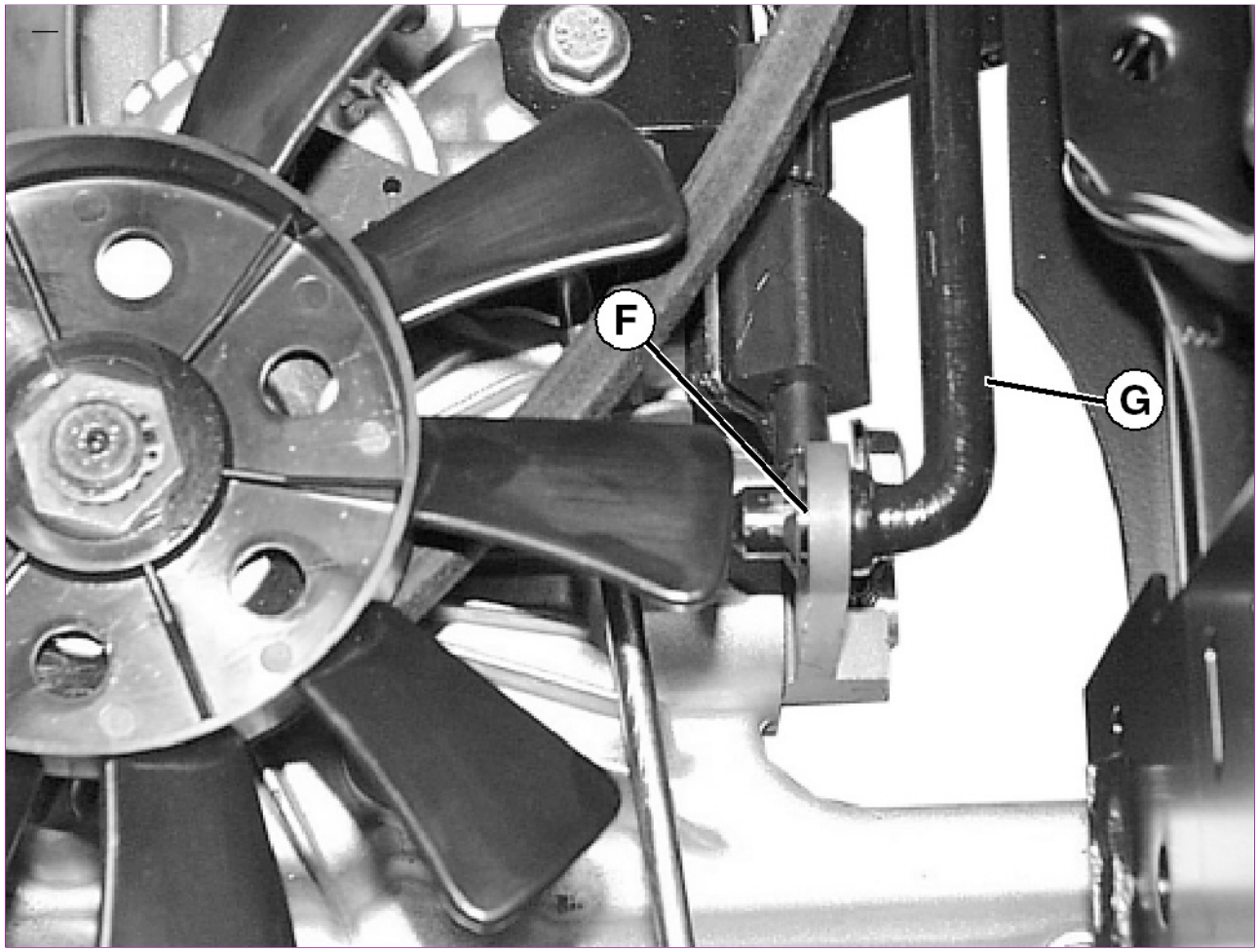
Removal:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Remove mower deck. See Removing Mower Deck in the Attachments section.
3. Remove battery and battery support bracket.
4. 

Remove spring (A) from fender deck and brake pedal assembly.

5. 

Remove nut and steering gear (C).
6. Raise steering control rod (D) just enough to clear sector gear (B) and steering sector plate (E).

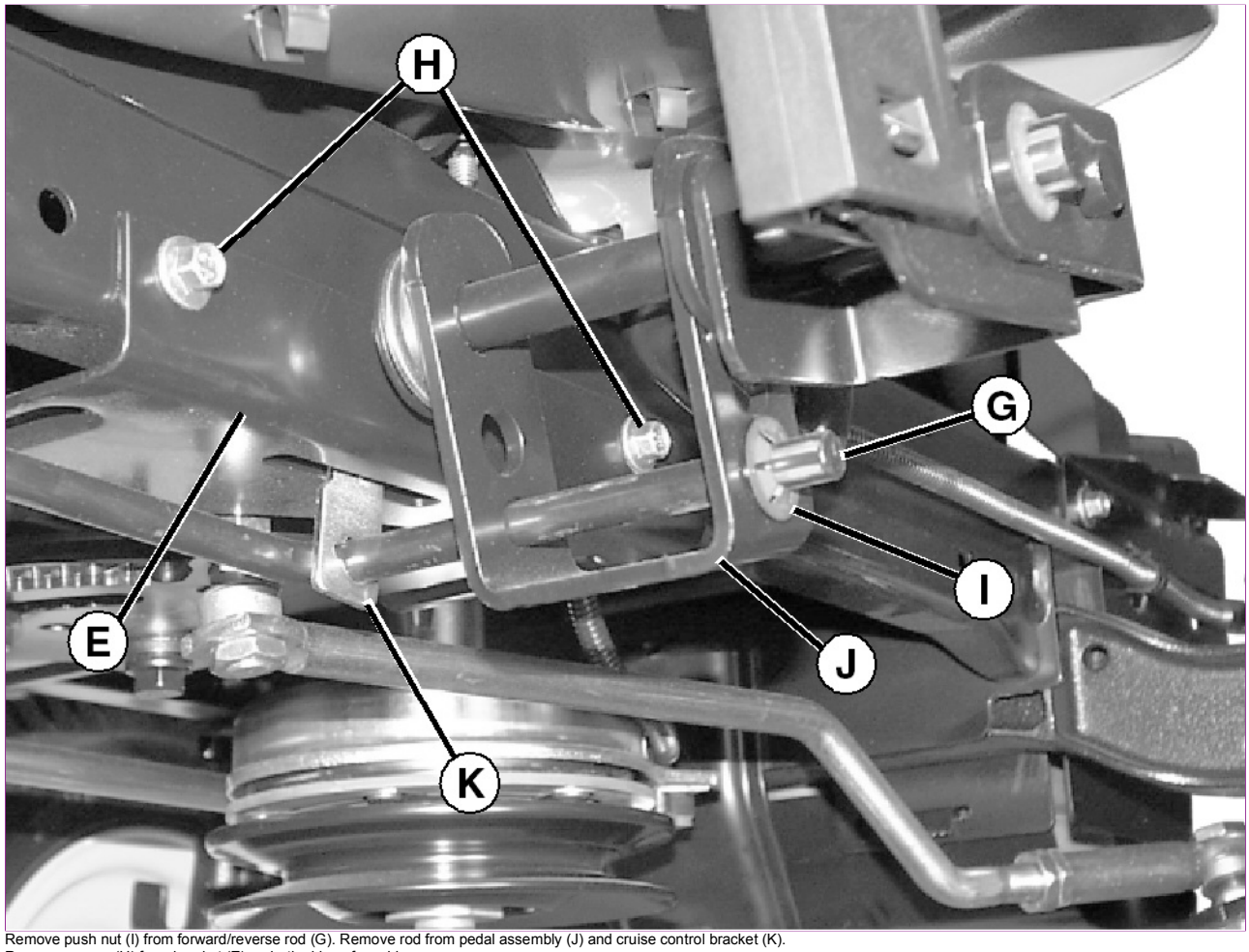
7. 

MXML2008120217011268-19: Shown with fenderdeck removed for clarity

8. From the right rear side of machine, remove push nut (F) securing forward/reverse rod (G).

NOTE:

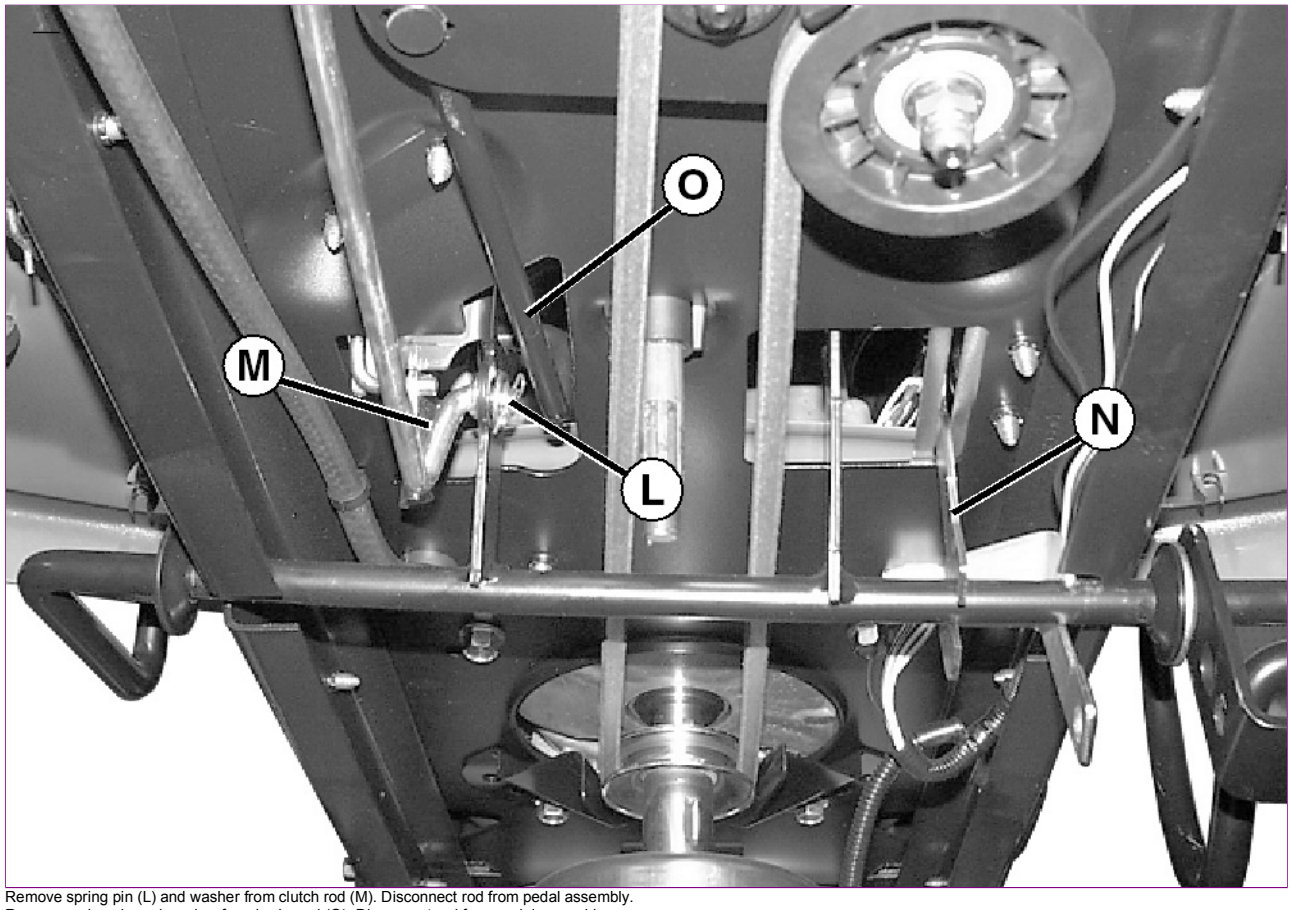
If the forward/reverse rod (G) is obstructed by the tie rod during removal, turn front wheels to the right.



Remove push nut (I) from forward/reverse rod (G). Remove rod from pedal assembly (J) and cruise control bracket (K).

9. Remove screws (H) from bracket (E) on both sides of machine.
10. *NOTE:*

    Be careful when lowering plate (F). Note location for hardware and linkage for forward/reverse pedal assembly during this procedure.



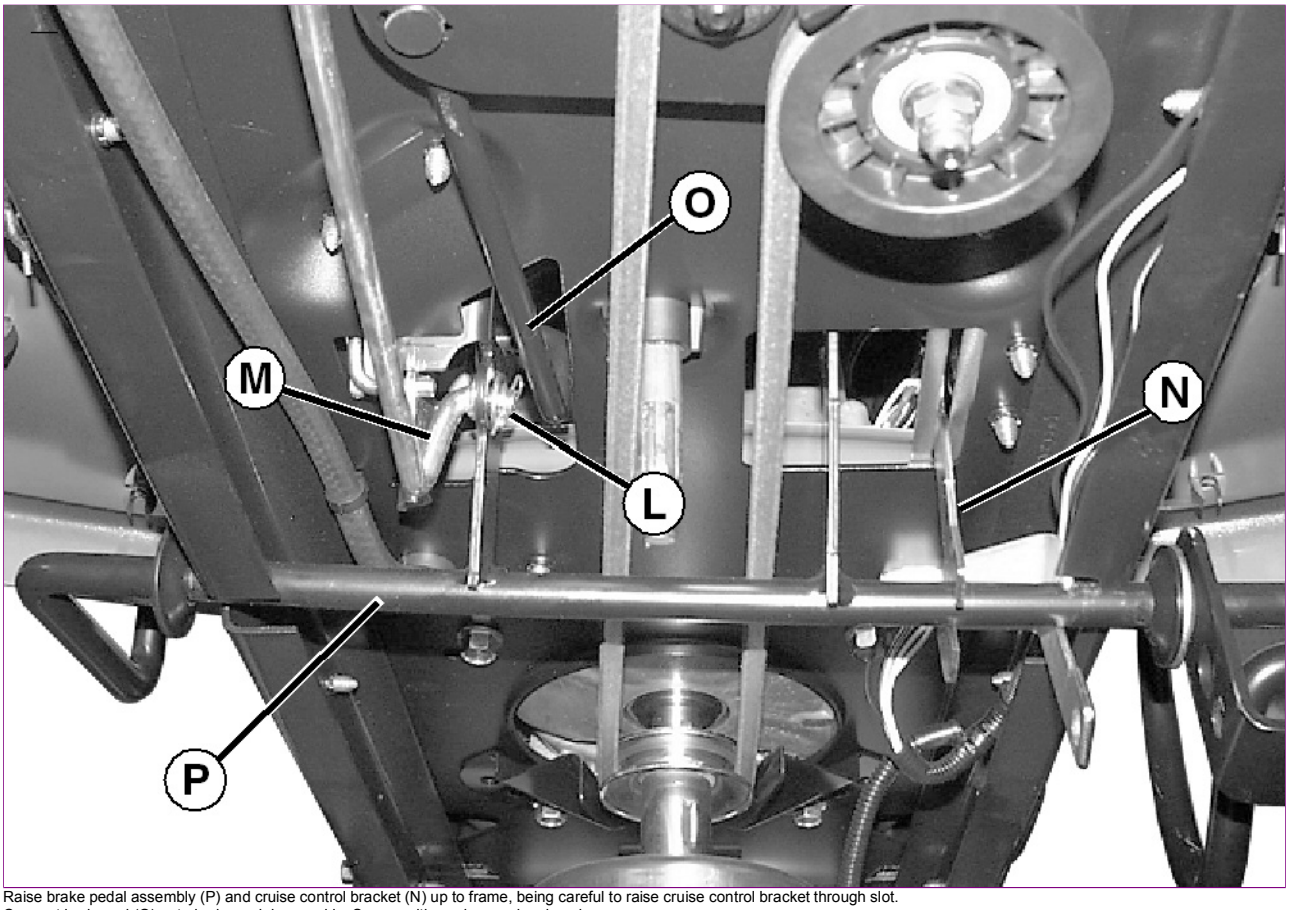
Remove spring pin (L) and washer from clutch rod (M). Disconnect rod from pedal assembly.

11. Remove spring pin and washer from brake rod (O). Disconnect rod from pedal assembly.
12. Remove cruise control bracket from pedal assembly. Remove pedal assembly from machine.
13. Inspect brake rod and pedals for damage. Replace as necessary.

Installation:

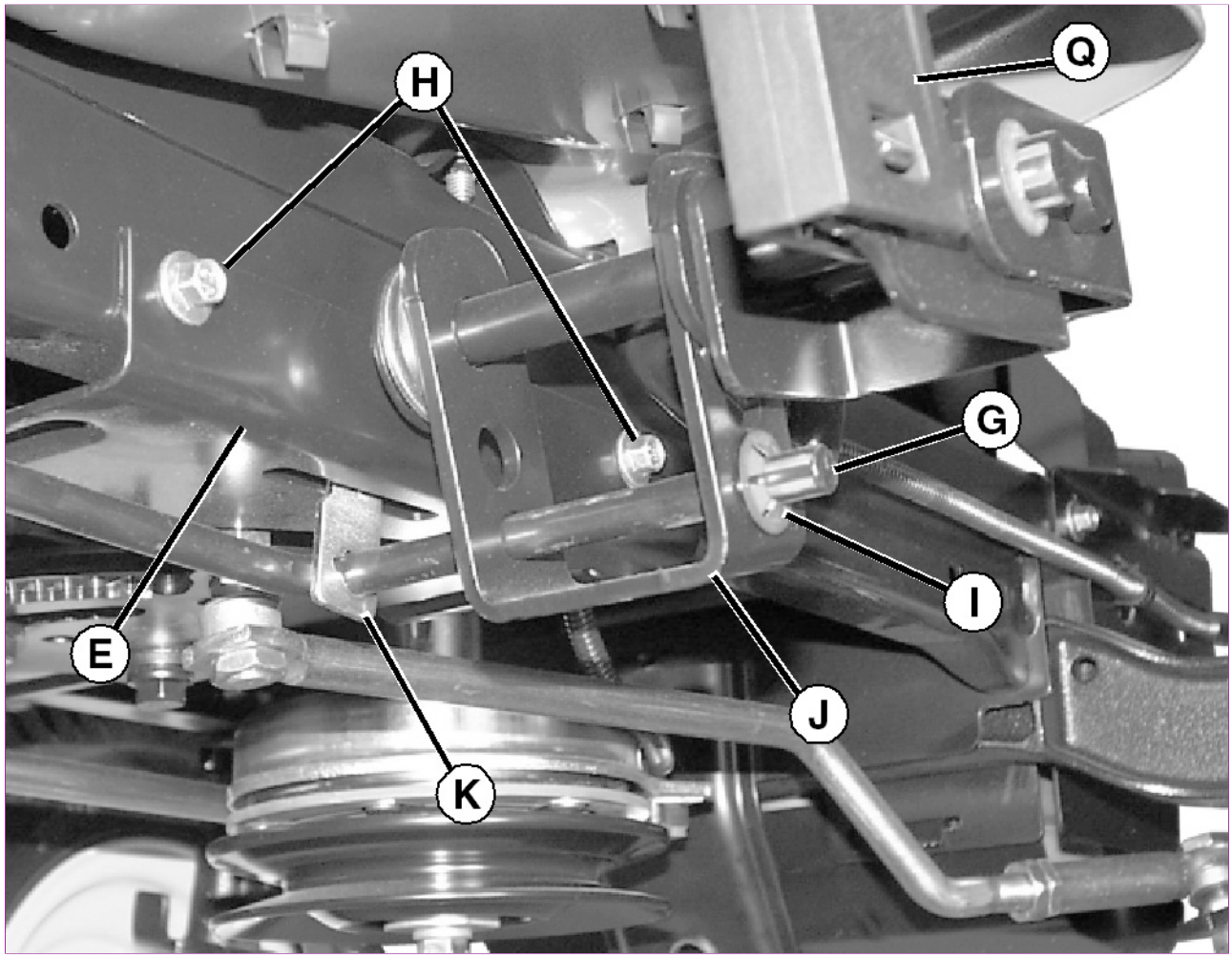
1. *NOTE:*

   Be careful when raising plate. Note location for hardware and linkage for brake pedal assembly during this procedure.

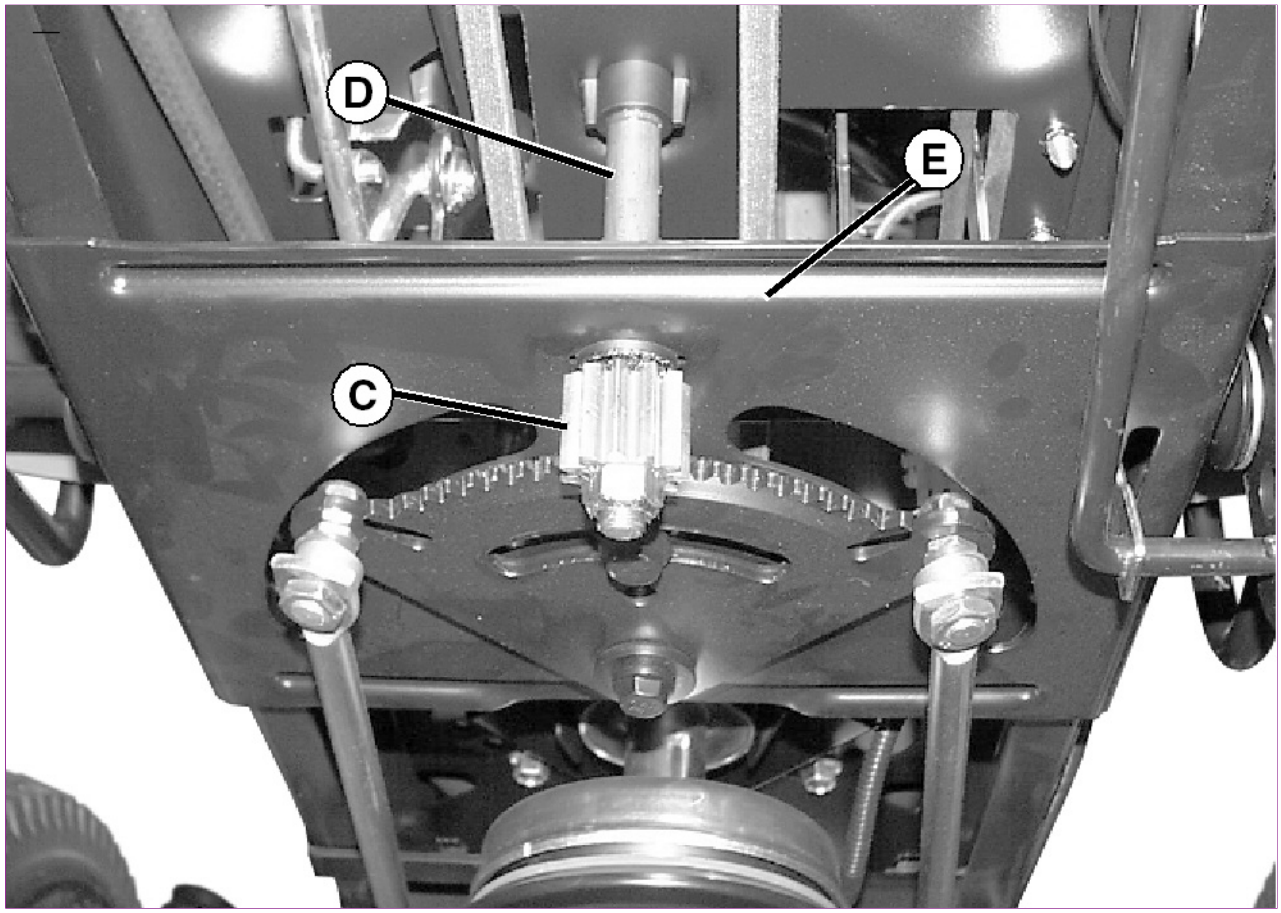


Raise brake pedal assembly (P) and cruise control bracket (N) up to frame, being careful to raise cruise control bracket through slot.

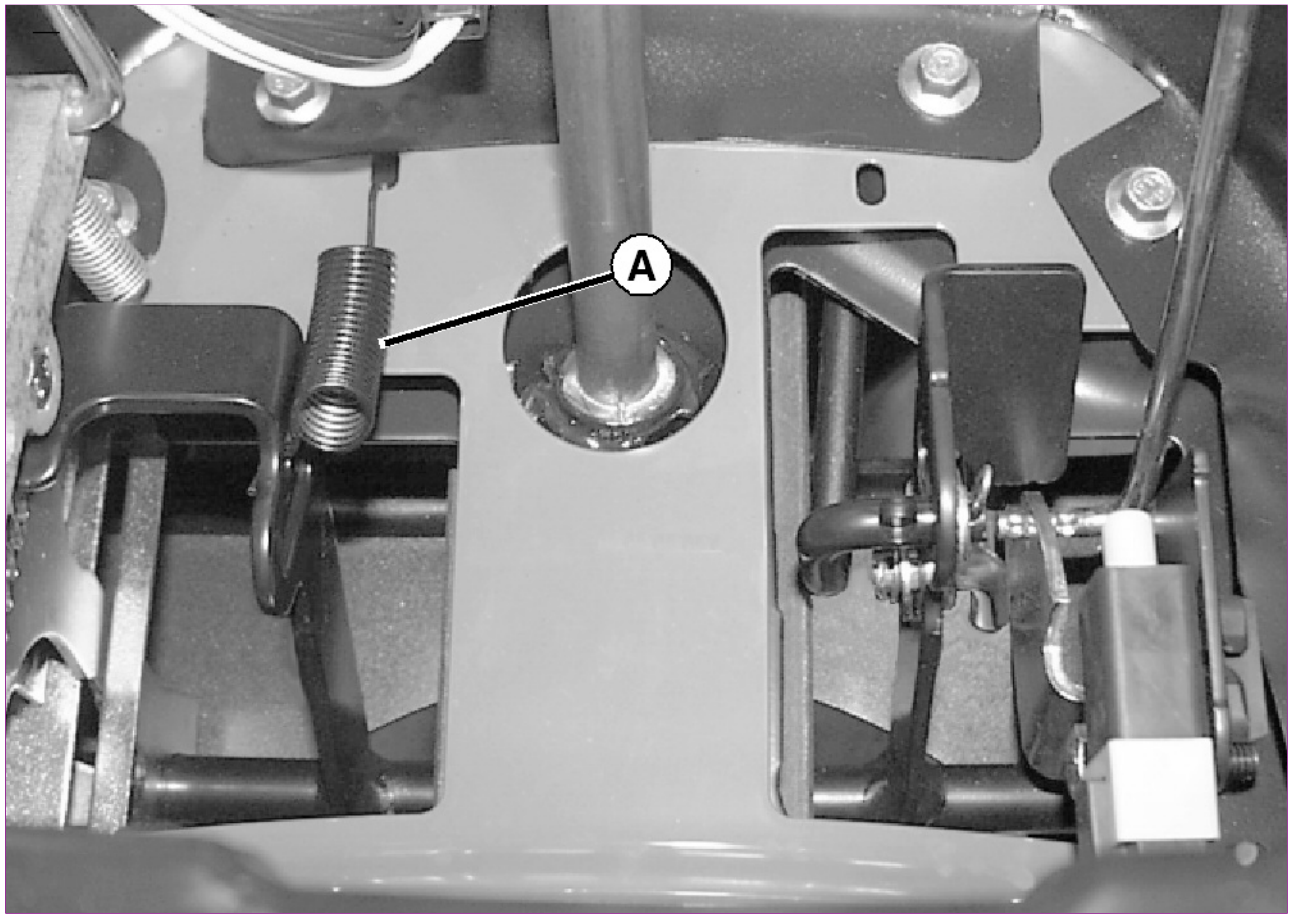
2. Connect brake rod (O) onto brake pedal assembly. Secure with washer, and spring pin.
3. Connect clutch rod (M) through brake pedal assembly lower slot. Secure with washer and spring pin (L).
4. Raise and install steering sector plate. Secure with four cap screws.



5. Raise reverse pedal (Q) up through fender deck, when raising bracket (E) onto frame. Secure bracket on both sides of machine frame with screws (H).
6. Install forward/reverse rod (G) through cruise control bracket (K) and onto brake pedal assembly (J). Secure with push nut (I).
7. Secure rear of forward/reverse rod to transaxle shift lever. Secure with push nut.



8. With wheels centered, lower steering control rod (D) through steering sector plate (E).
9. Install pinion gear (C). Secure with nut.



10. Install spring (A) onto fender deck and brake pedal assembly.
11. Install battery bracket and battery.
12. Install mower deck. See Installing Mower Deck in the Attachments section.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Repair Specifications

Repair Specifications

Item	Measurement	Specification
107 cm (42-Inch) and 122 cm (48-Inch) Mower Decks:		
Type		Rotary - Mulch, Bag or Side Discharge
Blade Cutting Edge		30 ± 5 Angle
Overall Cutting Width (107 cm (42-Inch) deck)		106.7 cm 42 in.)
Overall Cutting Width (122 cm (48-Inch) deck)		121.9 cm 48 in.)
Cutting Height (approximate)		25 - 102 mm 1 - 4 in.)
Spindle Lubrication		25 hour intervals

Item	Measurement	Specification
107 cm (42-Inch) and 122 cm (48-Inch) Mower Deck Torques Specifications:		
Blade Nut Torque (with M12 Nut)		75 N•m 55 lb-ft)
Blade Nut Torque (with 5/8 in. Nut)		88 N•m 65 lb-ft)
Gage Wheels-To-Deck		34 N•m 25 lb-ft)
Idler Sheave Nuts		47 N•m 35 lb-ft)
Spindle Sheave Nut		108 N•m 80 lb-ft)
Spindle Mounting Cap Screw		24 N•m 216 lb-in.)

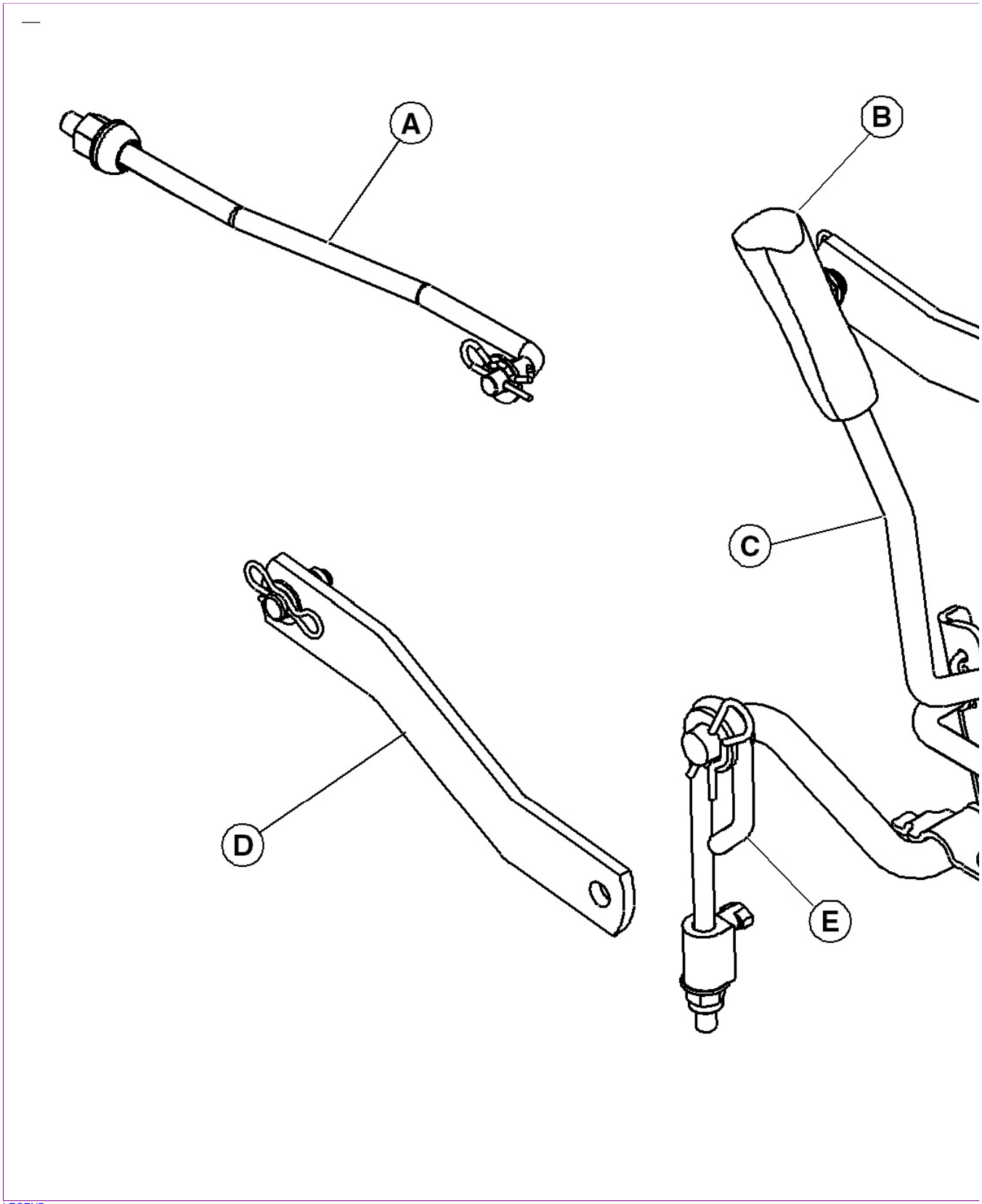
Item	Measurement	Specification
137 cm (54-Inch) Mower Deck:		
Type		Rotary - Mulch, Bag or Side Discharge
Blade Cutting Edge		30 ± 5 Angle
Overall Cutting Width		137.1 cm 54 in.)
Cutting Height (approximate)		25 - 102 mm

		1 - 4 in.)
Spindle Lubrication		25 hour intervals

Item	Measurement	Specification
137 cm (54-Inch) Mower Deck Torque Specifications:		
Blade Nut Torque (with M12 Nut)		75 N•m 55 lb-ft)
Blade Nut Torque (with 5/8 in. Nut)		88 N•m 65 lb-ft)
Gauge Roller Shaft Nut Torque		30 N•m 22 lb-ft)
Idler Sheave Nuts		47 N•m 35 lb-ft)
Spindle Lower Seal Installation Position (below hub flange)		7.8 mm 0.31 in.)
Spindle Mounting Nut Torque		24 N•m 216 lb-in.)
Spindle Sheave Nut Torque		142 N•m 105 lb-ft)

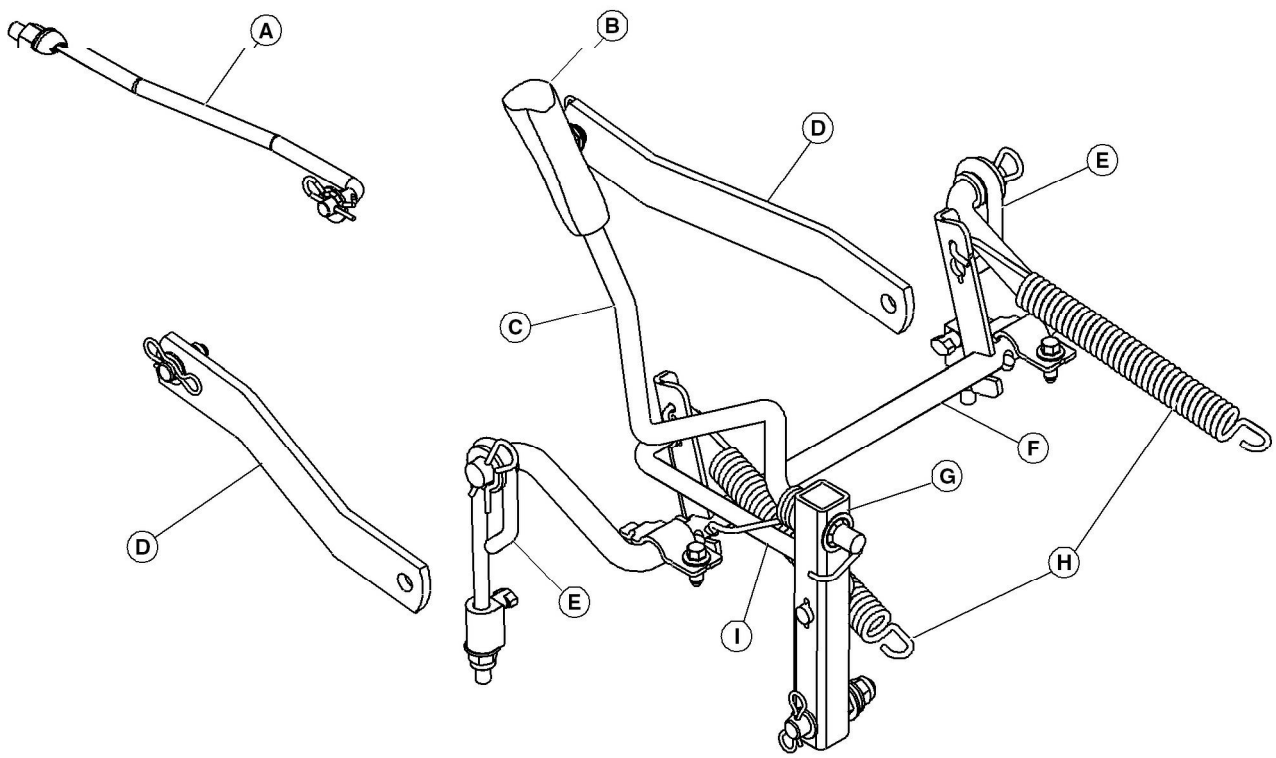
Blade Height Gauge.....AM130907
Use to check mower level

Deck Lift Assembly

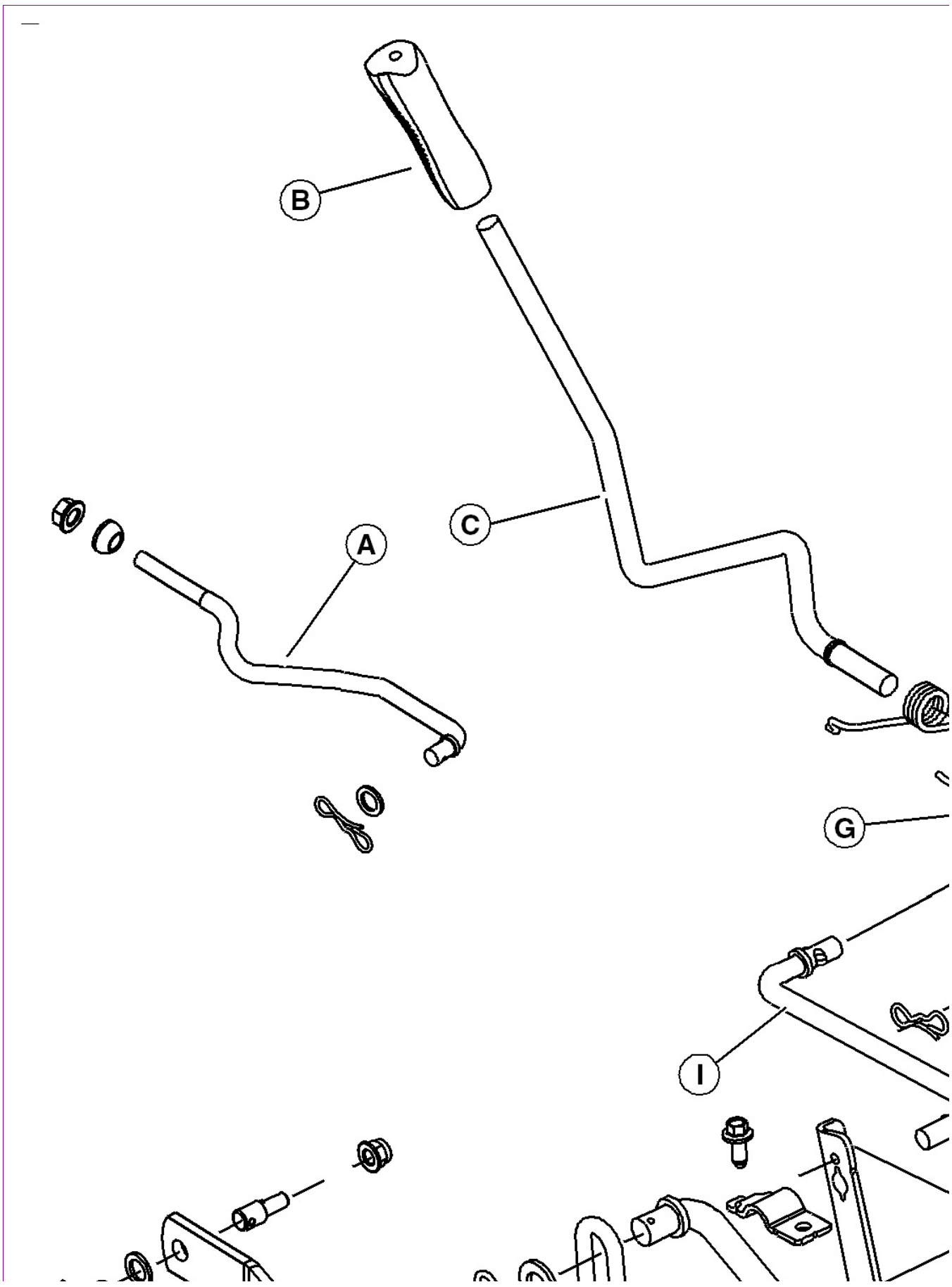


LEGEND:

A - Front Draft Arm
B - Handle Grip
C - Deck Lift Handle
D - Deck Suspension Arms
E - Deck Suspension Hanger (J Arm)
F - Welded Lift Pivot Shaft (54-Inch Deck Shown)
G - Lift Handle Tube
H - Lift Assist Springs (2 used for 54 Inch Deck)
I - Connecting Link

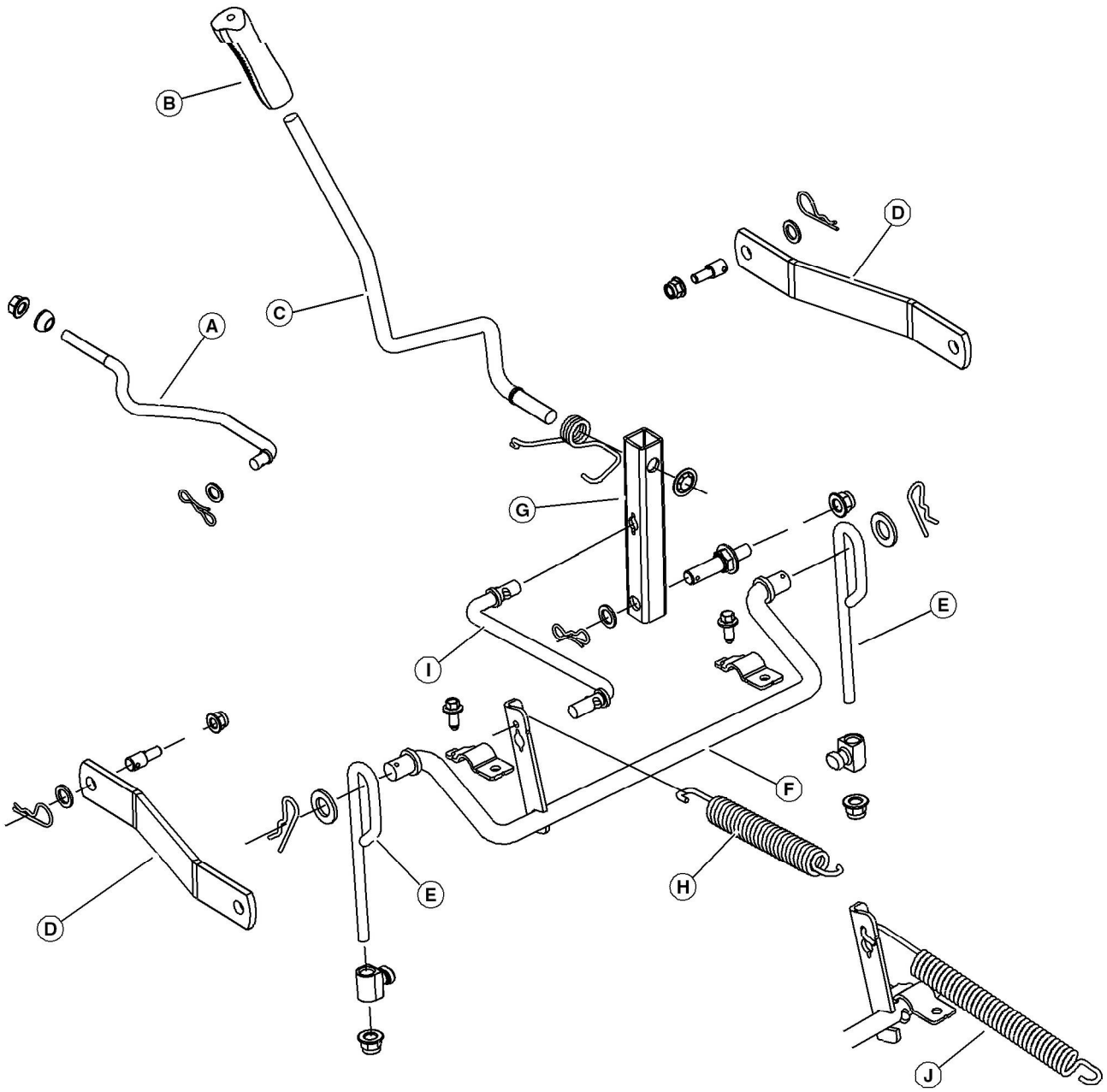

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Deck Lift Components

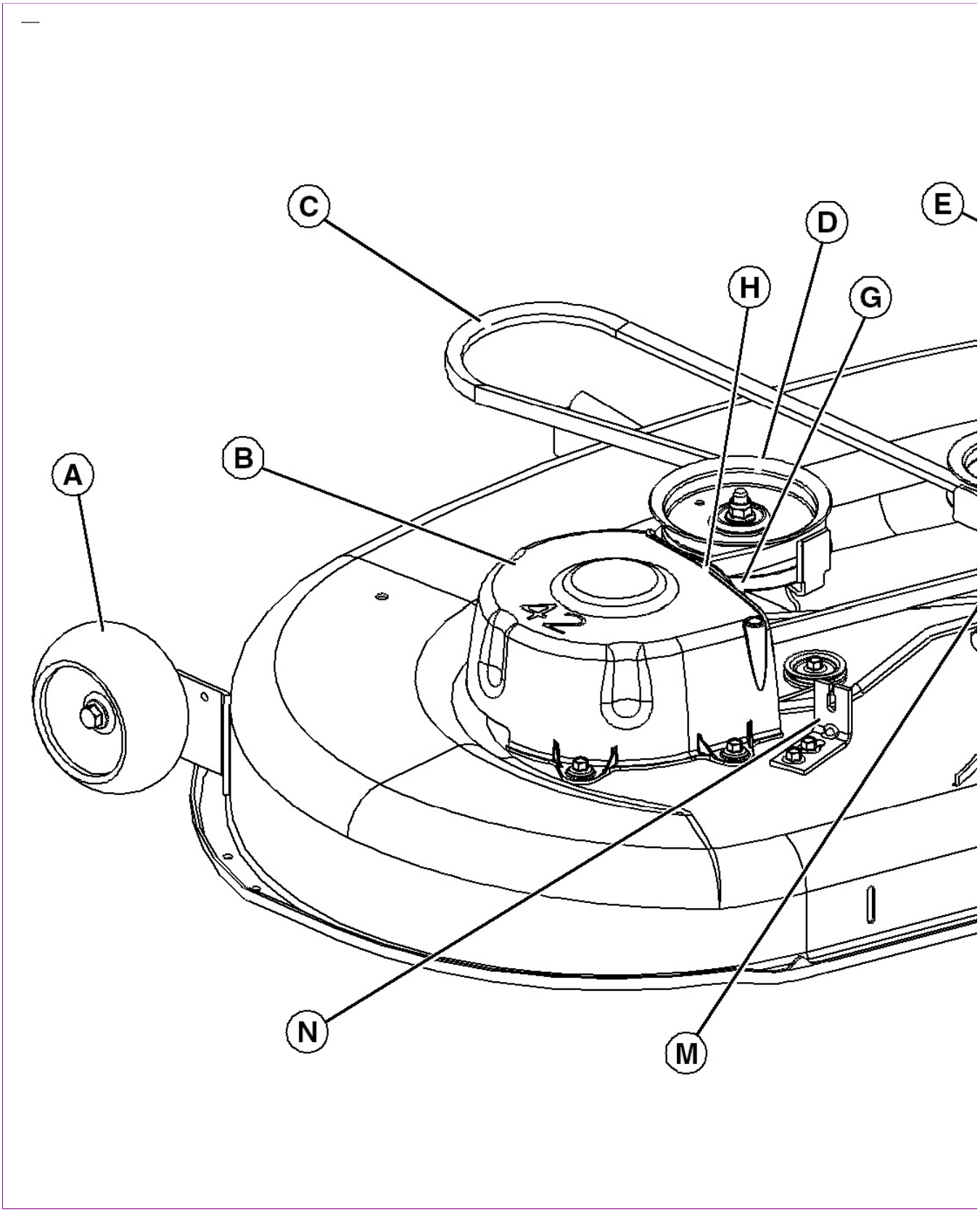

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LEGEND:

A - Front Draft Arm
B - Handle Grip
C - Deck Lift Handle
D - Deck Suspension Arms
E - Deck Suspension Hanger (J Arm)
F - Welded Lift Pivot Shaft (42-Inch and 44-Inch Decks Shown)
G - Lift Handle Tube
H - Lift Assist Spring
I - Connecting Link
J - Lift Assist Spring (54 Inch Deck Only - Right Hand Side)

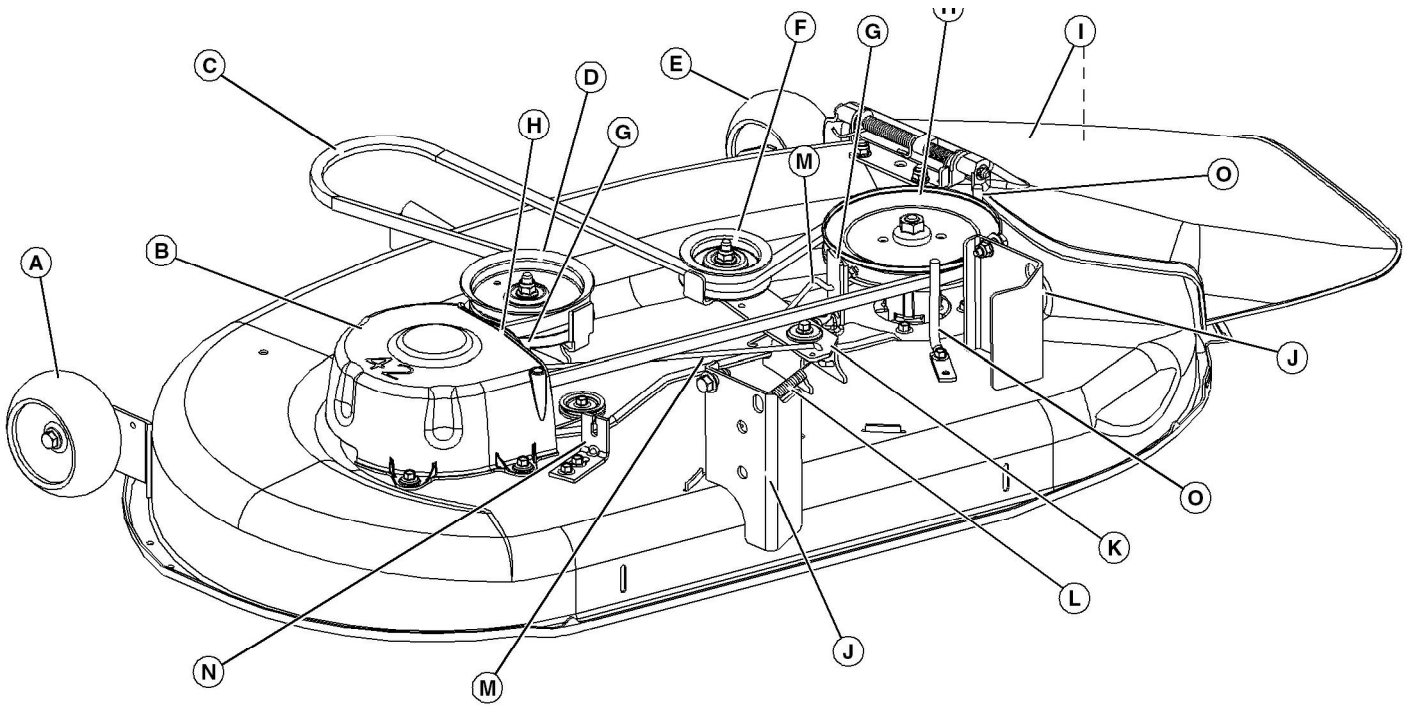

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42-Inch Mower Deck

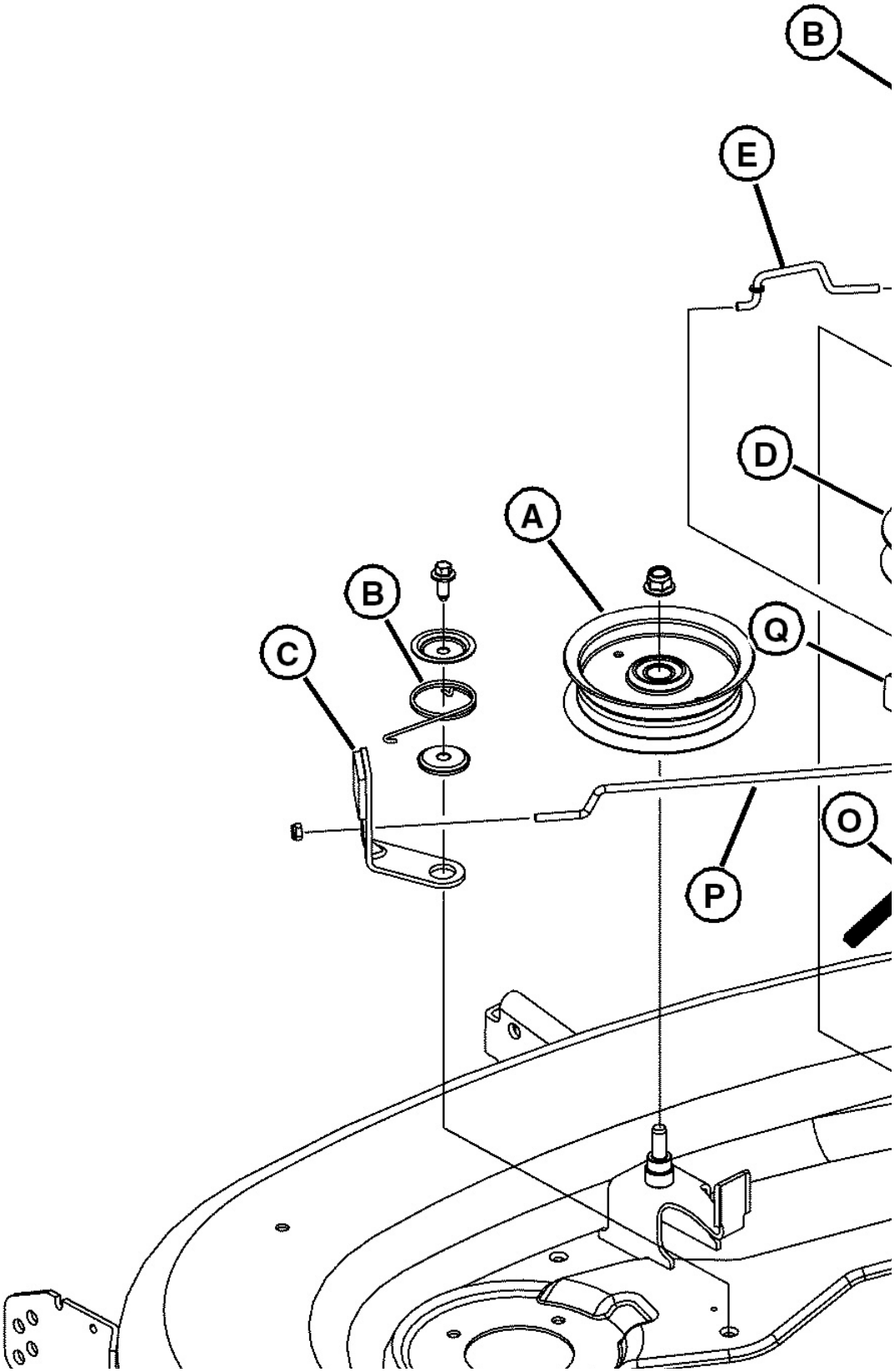


LEGEND:

A - Gage Wheel (Left Front)
B - Belt Cover
C - Primary Drive Belt
D - Flat Idler (fixed)
E - Gage Wheel (Right Front)
F - Flat Idler Sheave
G - Left and Right Blade Brake Assembly
H - Spindle Sheave
I - Discharge Chute and Metal Deflector
J - Deck Leveling Bracket
K - Idler Arm
L - Spring
M - Left and Right Brake Rod
N - PTO Cable Mounting Bracket
O - Belt Guides (2)

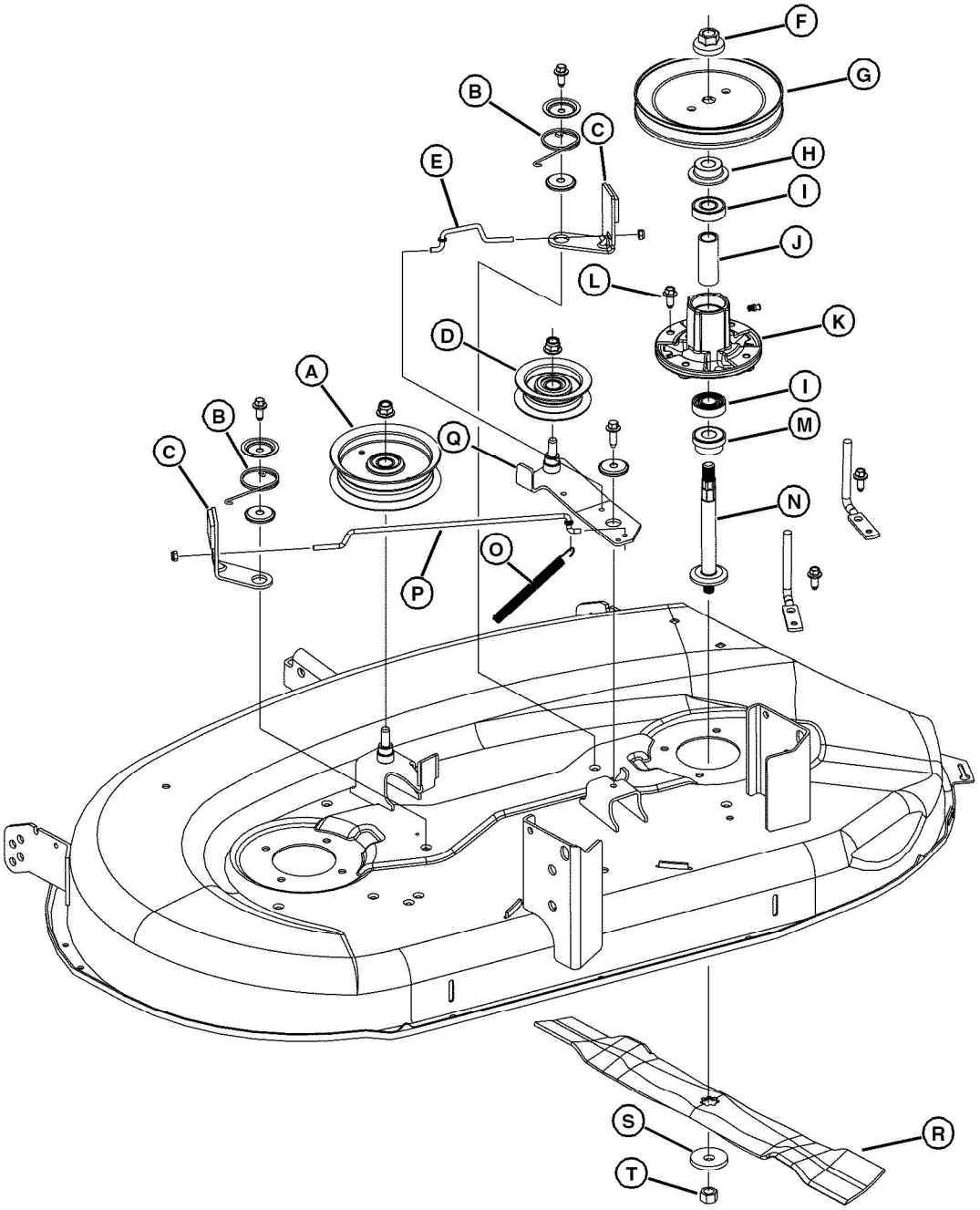

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Idlers and Sheaves - 42-Inch Deck

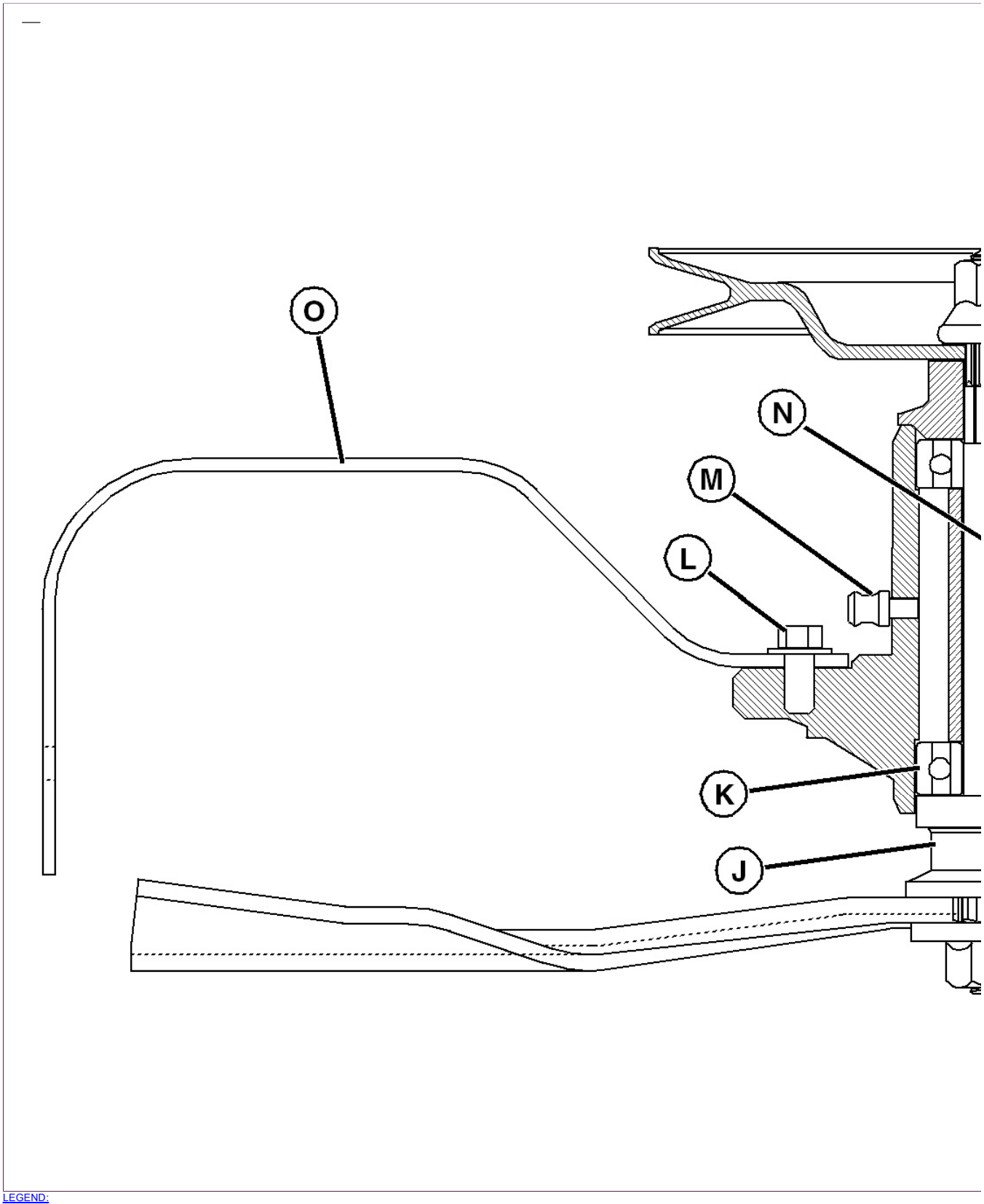

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LEGEND:

A - Idler Sheave
B - Spring, Brake (2 used)
C - Brake, Spindle (2 used)
D - Idler, Belt Tension
E - Brake Rod, Right Spindle
F - Spindle Nut (2 used)
G - Spindle Sheave (2 used)
H - Seal (2 used)
I - Ball Bearing (4 used)
J - Spacer (2 used)
K - Spindle (2 used)
L - Cap Screw (4 used on each spindle)
M - Seal (2 used)
N - Blade Spindle (2 used)
O - Idler Tensioning Spring
P - Brake Rod, Left Spindle
Q - Idler Tensioning Bracket
R - Blade (2 used)
S - Washer (2 used)
T - Nut (2 used)

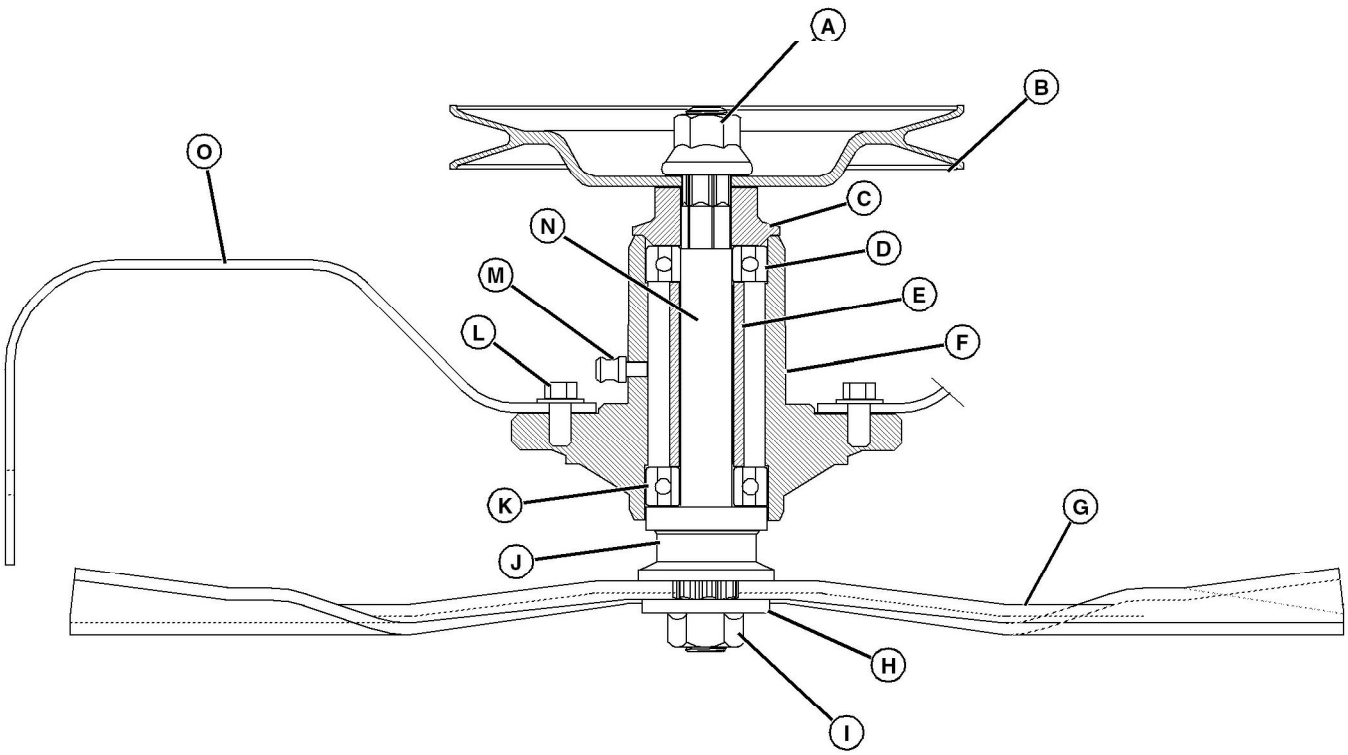

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Spindle Cross Section - 42-Inch Deck

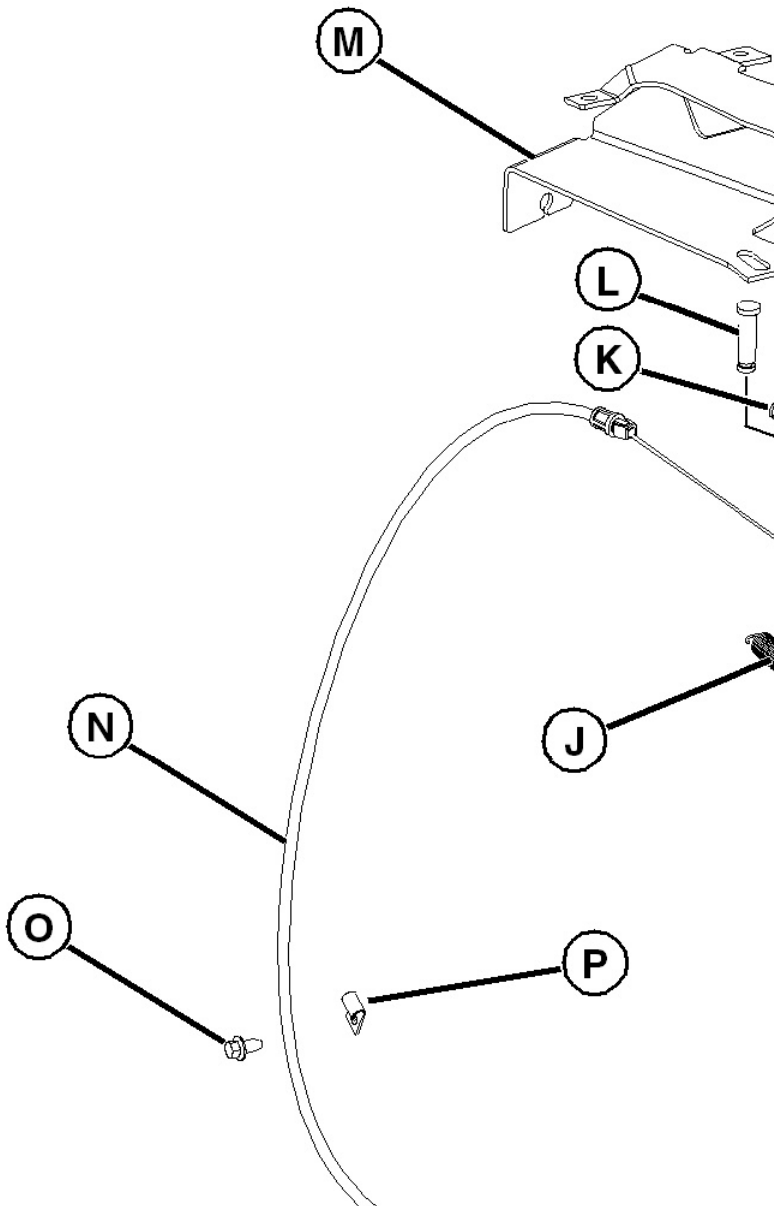


LEGEND:

A - Nut
B - Spindle Sheave
C - Upper Seal Ring
D - Upper Bearing
E - Spacer
F - Spindle Housing
G - Blade
H - Washer
I - Nut
J - Spacer
K - Lower Bearing
L - Cap Screw (4 used)
M - Lubrication Fitting
N - Spindle Shaft
O - Deck

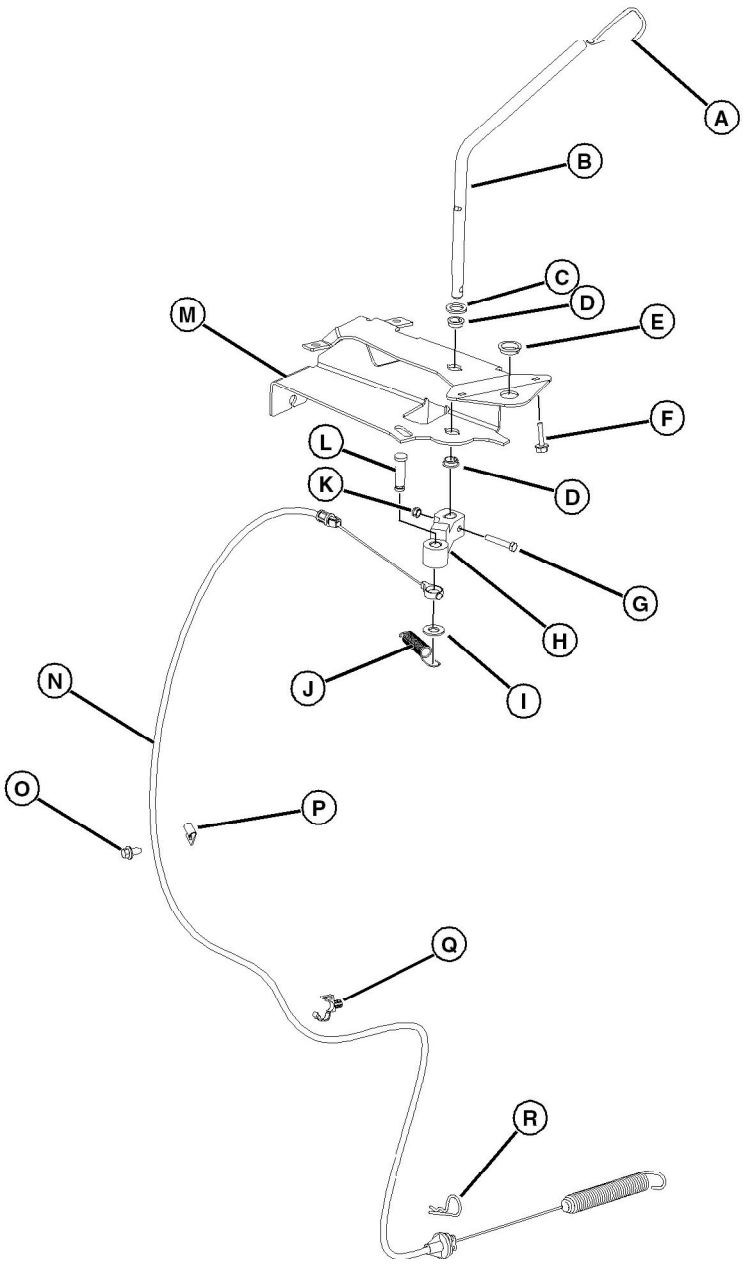

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Engagement - 42-Inch Deck

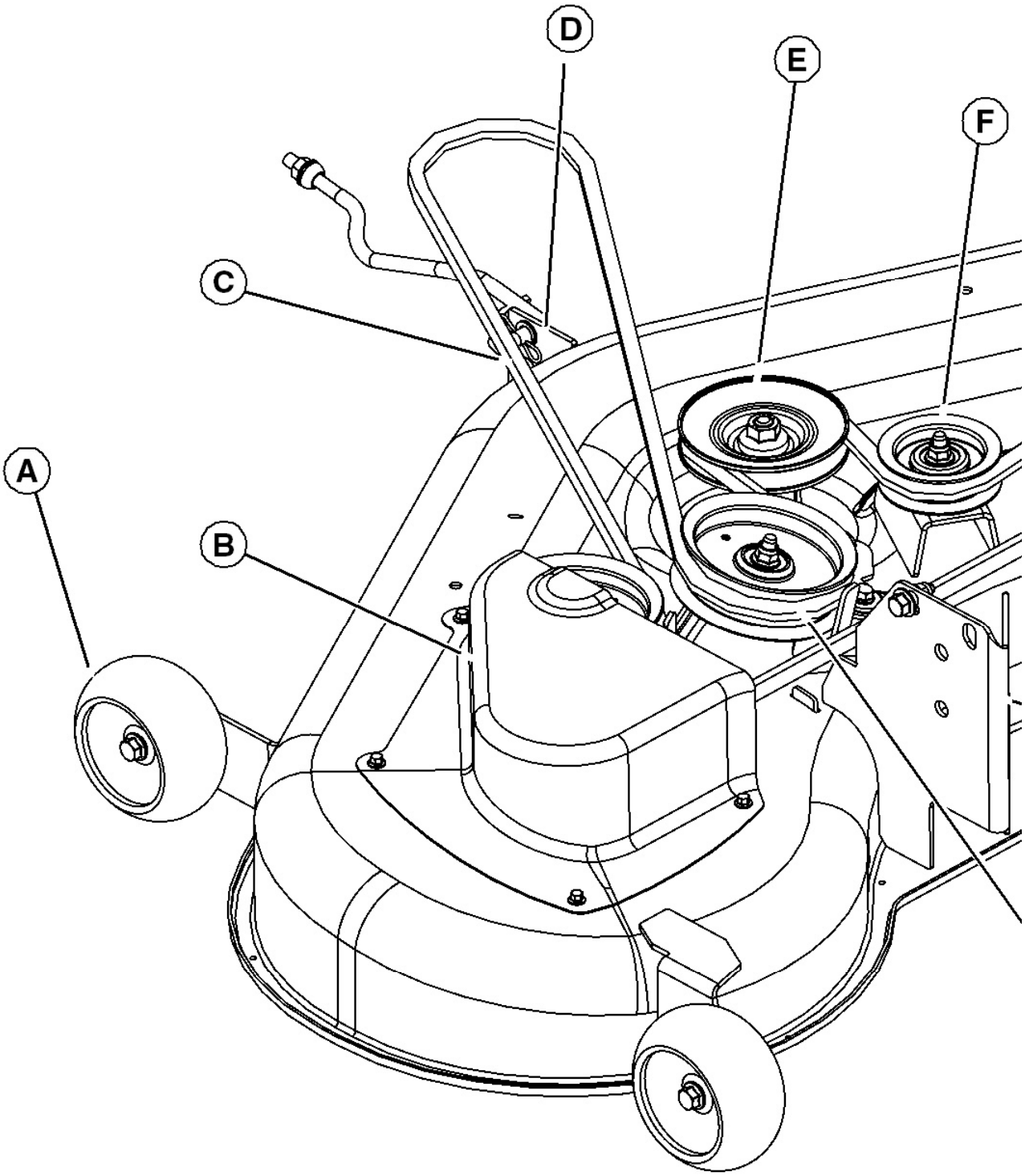

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LEGEND:

A - Handle
B - Lever
C - Washer
D - Bushing (2 used)
E - Bushing, Steering Shaft
F - Cap Screw (4 used)
G - Bolt M5x30
H - Lever
I - Washer
J - Spring
K - Lock Nut M5
L - Pin
M - Bracket, Support
N - Cable, Engagement
O - Screw M6x12
P - Retaining Clip
Q - Clip (2 used)
R - Spring Locking Pin


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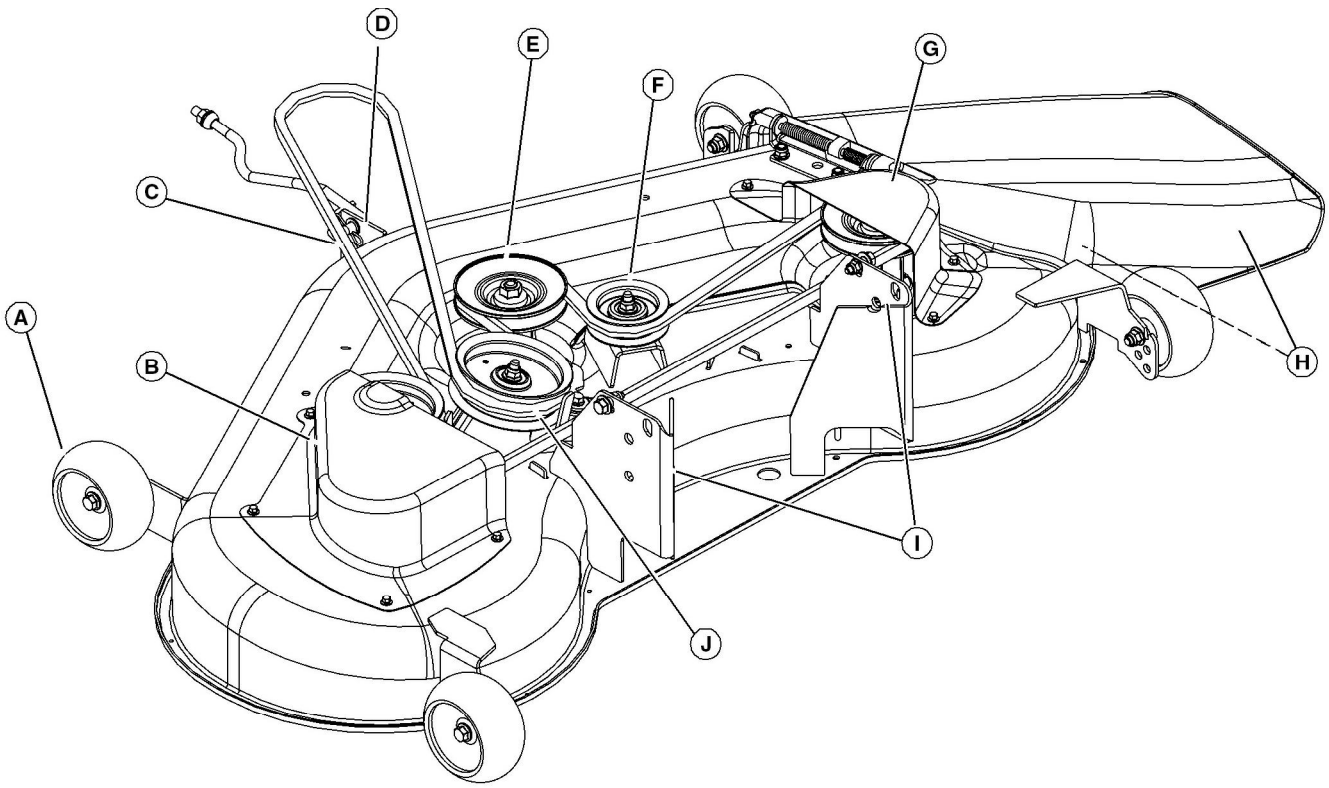
48-Inch Mower Deck



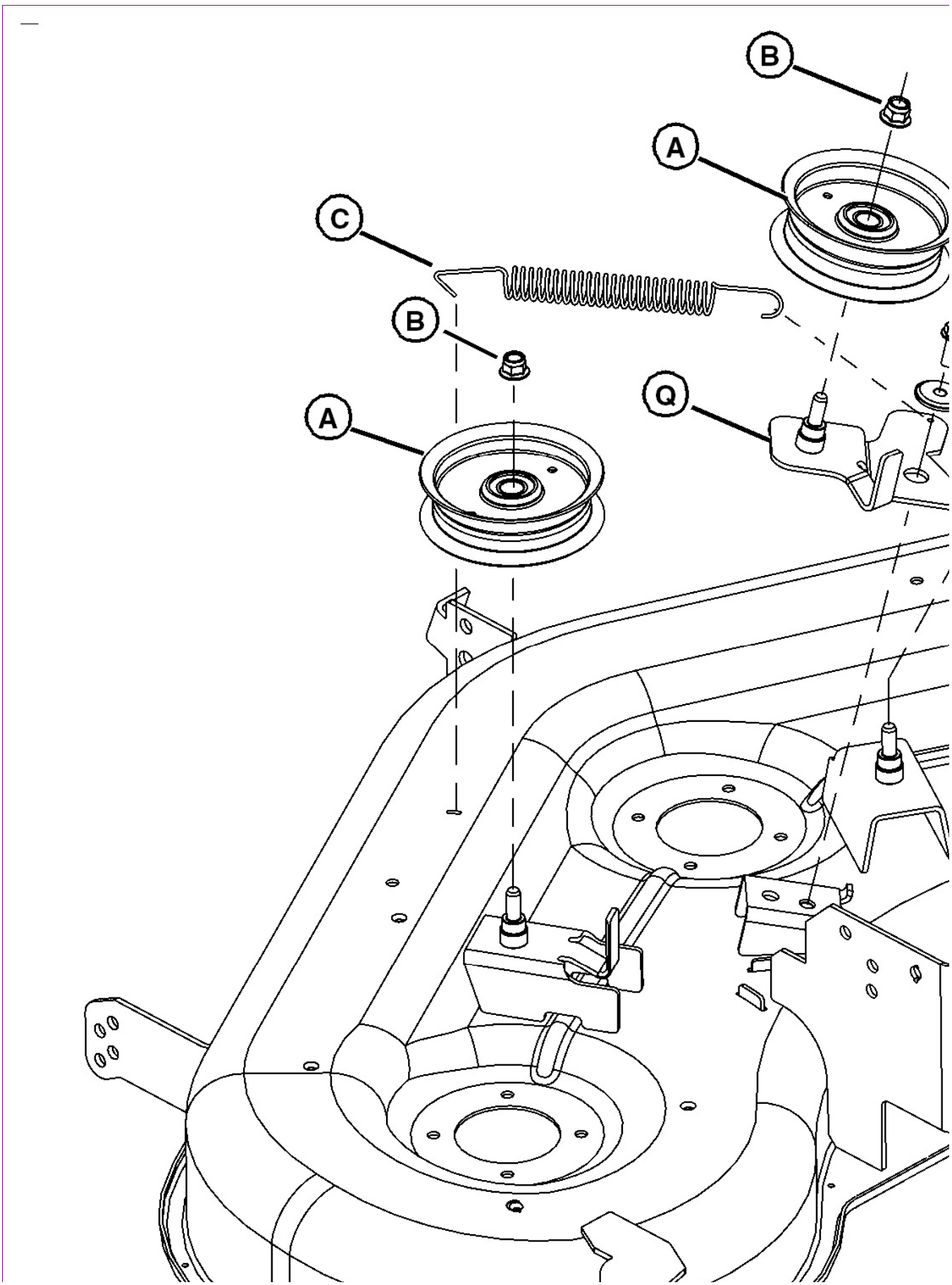
LEGEND:

A - Gage Wheel
B - Belt Shield (Left)
C - Primary Drive Belt

D - Front Draft Bracket
E - Sheave (Center Spindle)
F - Fixed Idler
G - Belt Shield (Right)
H - Discharge Chute and Metal Deflector
I - Deck Leveling Bracket
J - Flat Idler

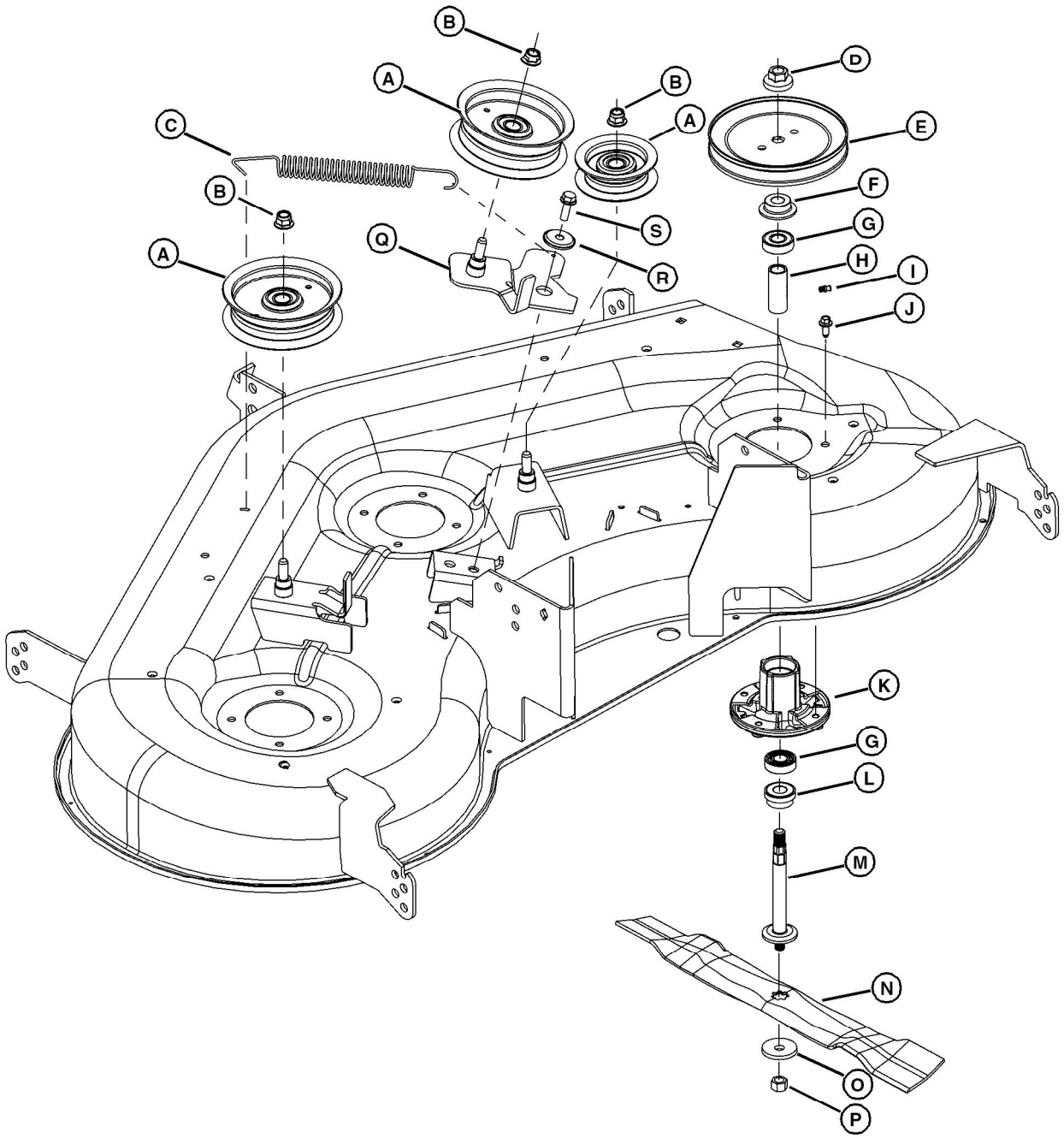

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Idlers and Sheaves - 48-Inch Deck

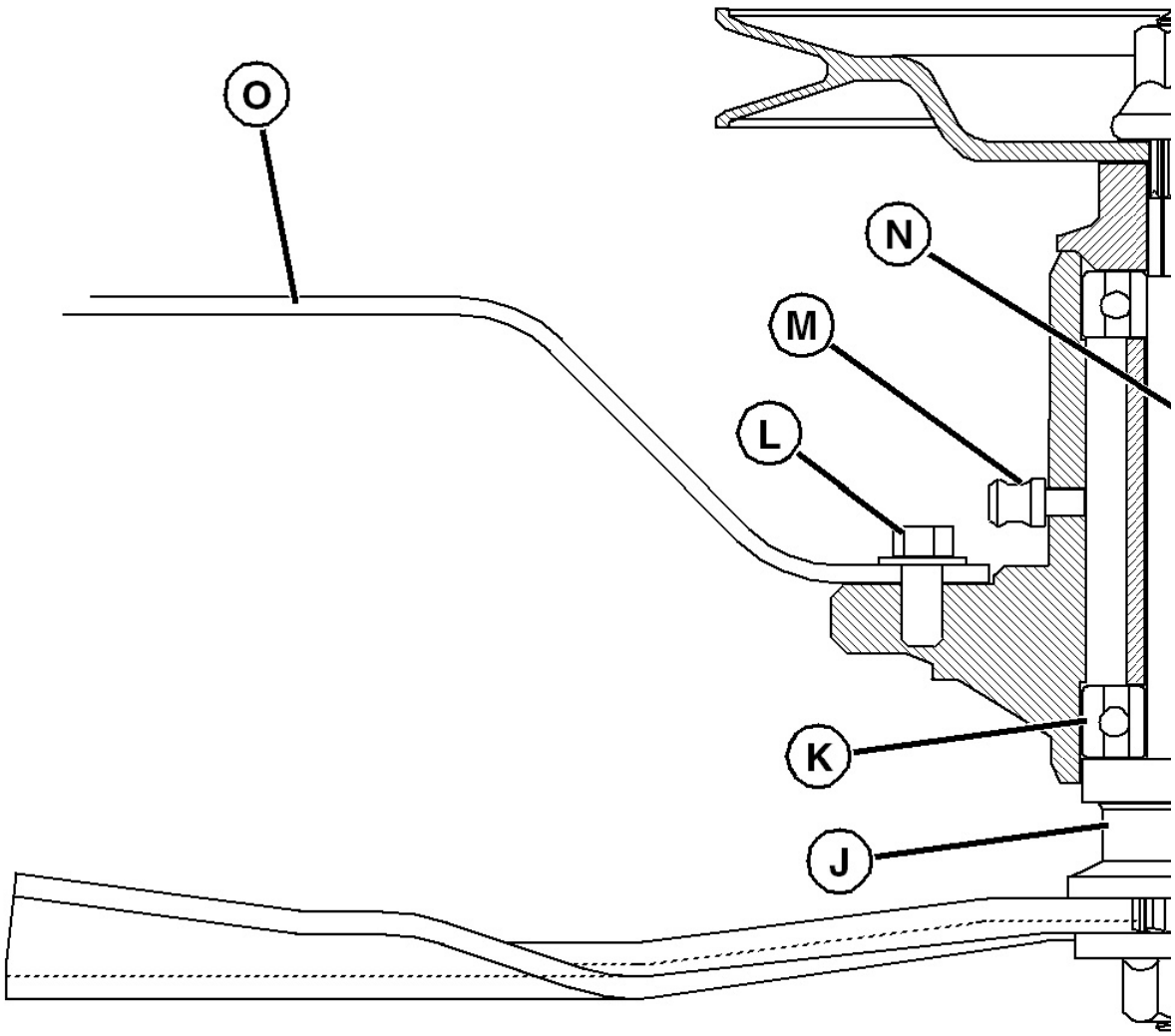

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LEGEND:

A - Idler Sheave (3 used)
B - Locking Nut (3 used)
C - Idler Tensioning Spring
D - Spindle Nut (3 used)
E - Spindle Sheave (3 used)
F - Seal (3 used)
G - Ball Bearing (6 used)
H - Spacer (3 used)
I - Grease Fitting (3 used)
J - Screw (12 used)
K - Spindle (3 used)
L - Seal (3 used)
M - Blade Spindle (3 used)
N - Blade (3 used)
O - Washer (3 used)
P - Nut (3 used)
Q - Idler Tensioning Bracket
R - Washer
S - Cap Screw

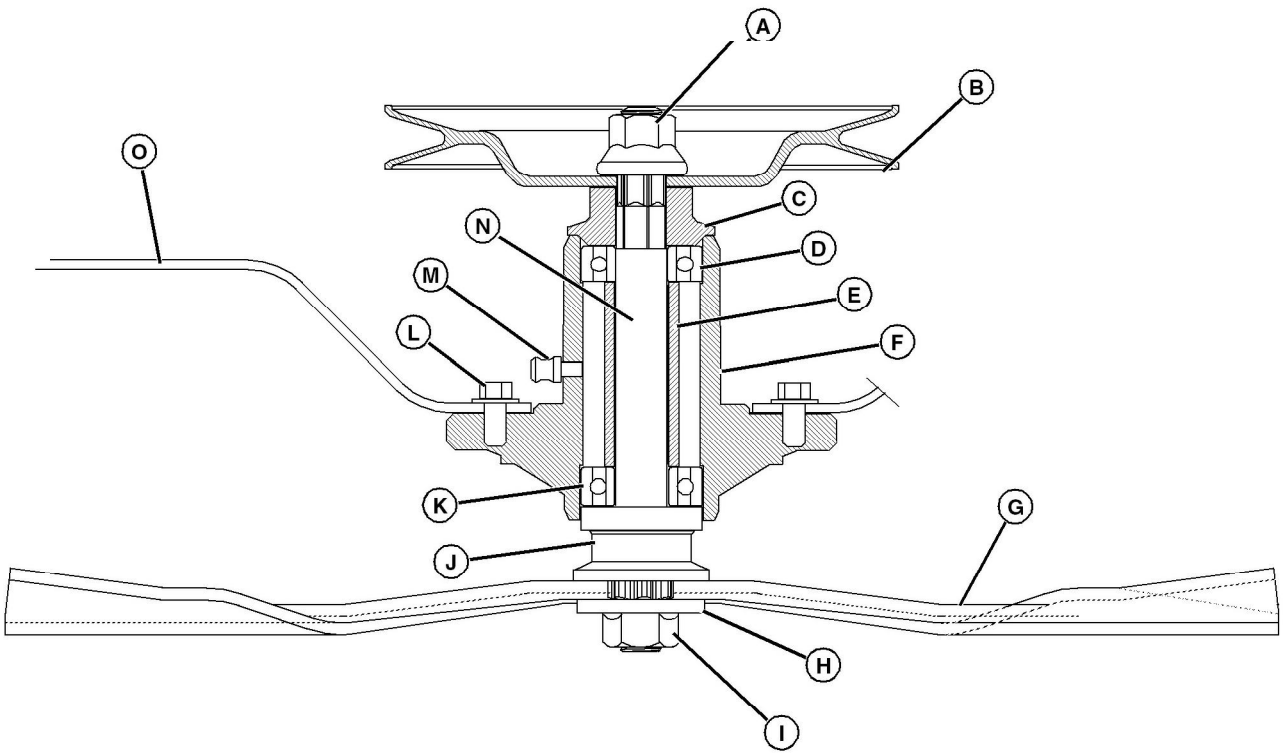

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Spindle Cross Section - 48-Inch Deck



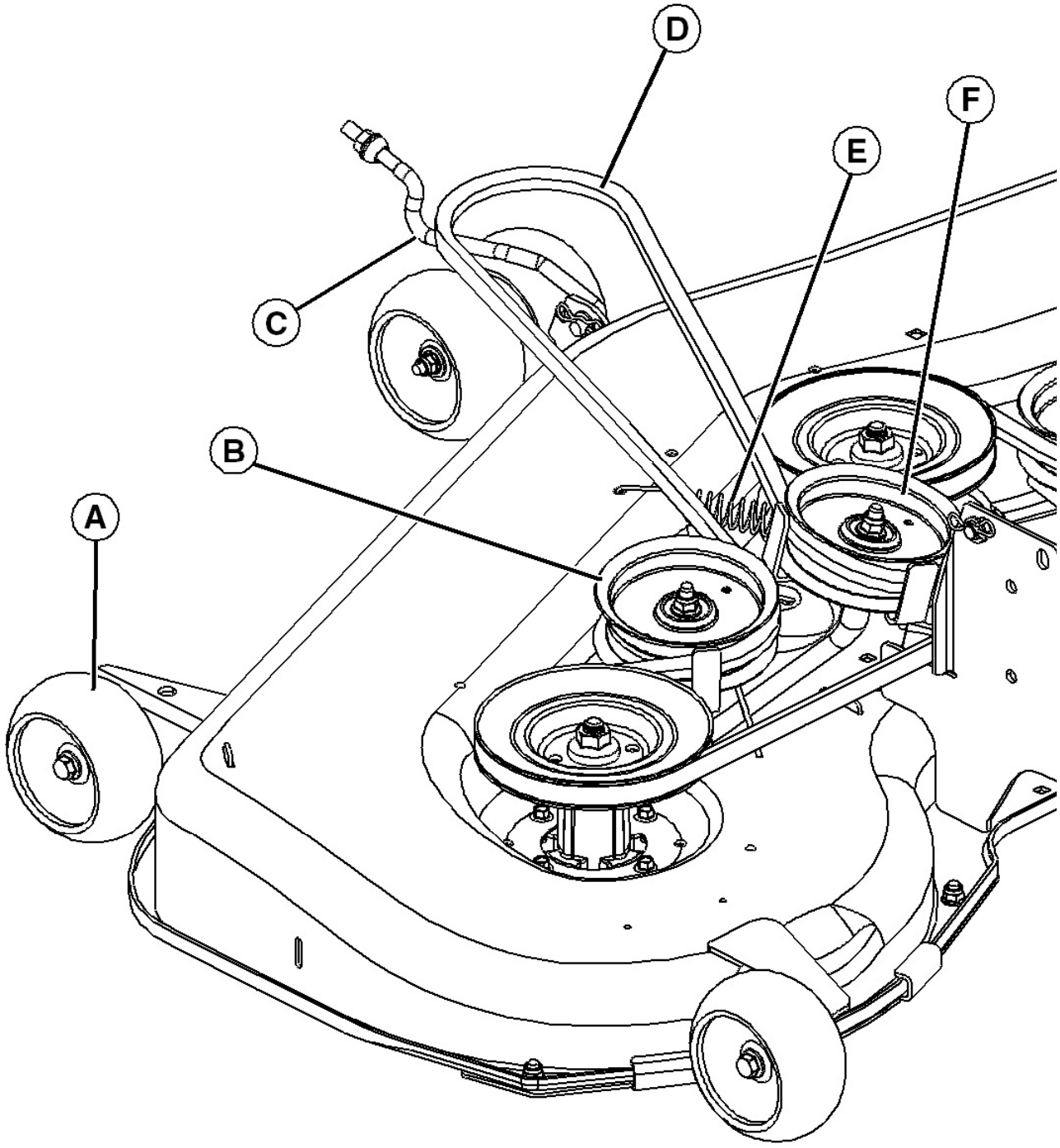
LEGEND:

A - Nut
B - Spindle Sheave
C - Upper Seal Ring
D - Upper Bearing
E - Spacer
F - Spindle Housing
G - Blade
H - Washer
I - Nut
J - Spacer
K - Lower Bearing
L - Cap Screw (4 used)
M - Lubrication Fitting
N - Spindle Shaft
O - Deck


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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
54-Inch Mower Deck

54-Inch Mower Deck

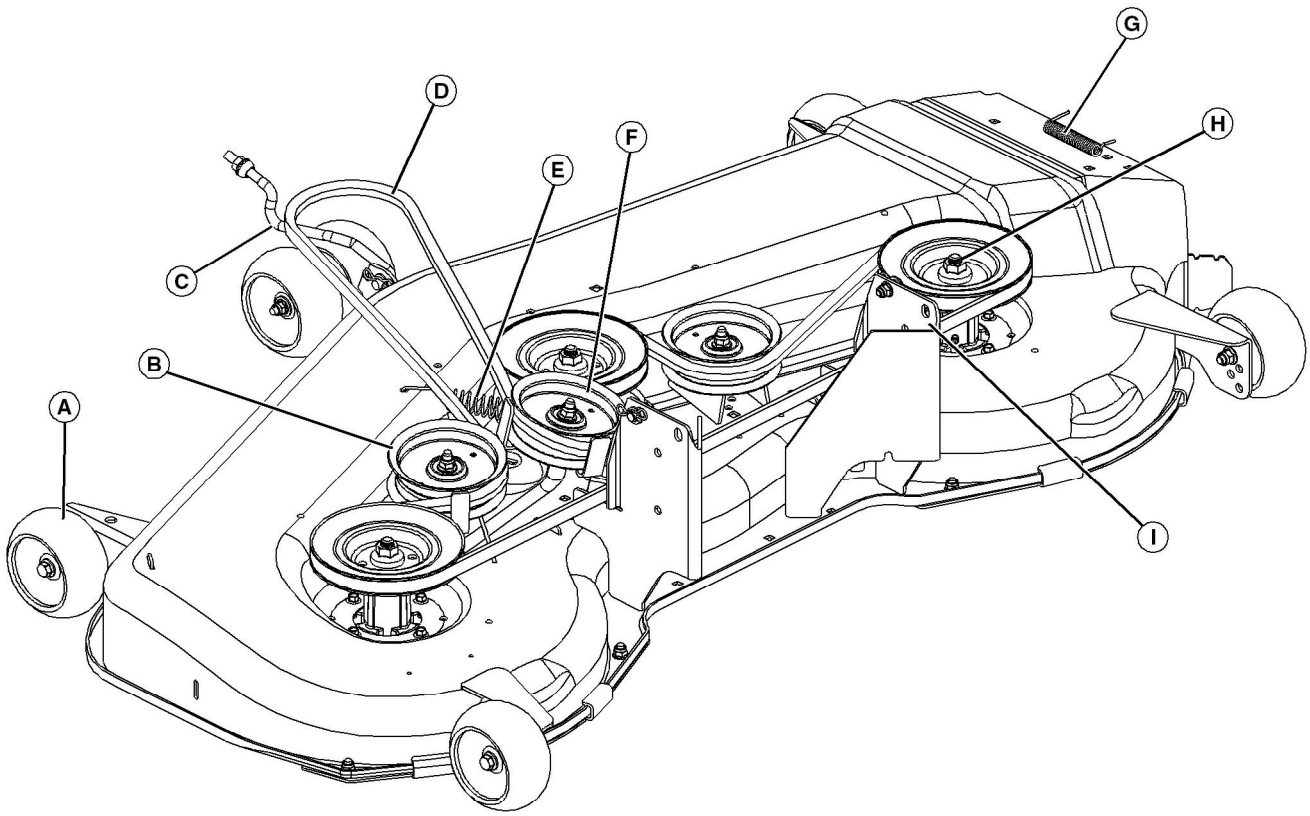

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LEGEND:

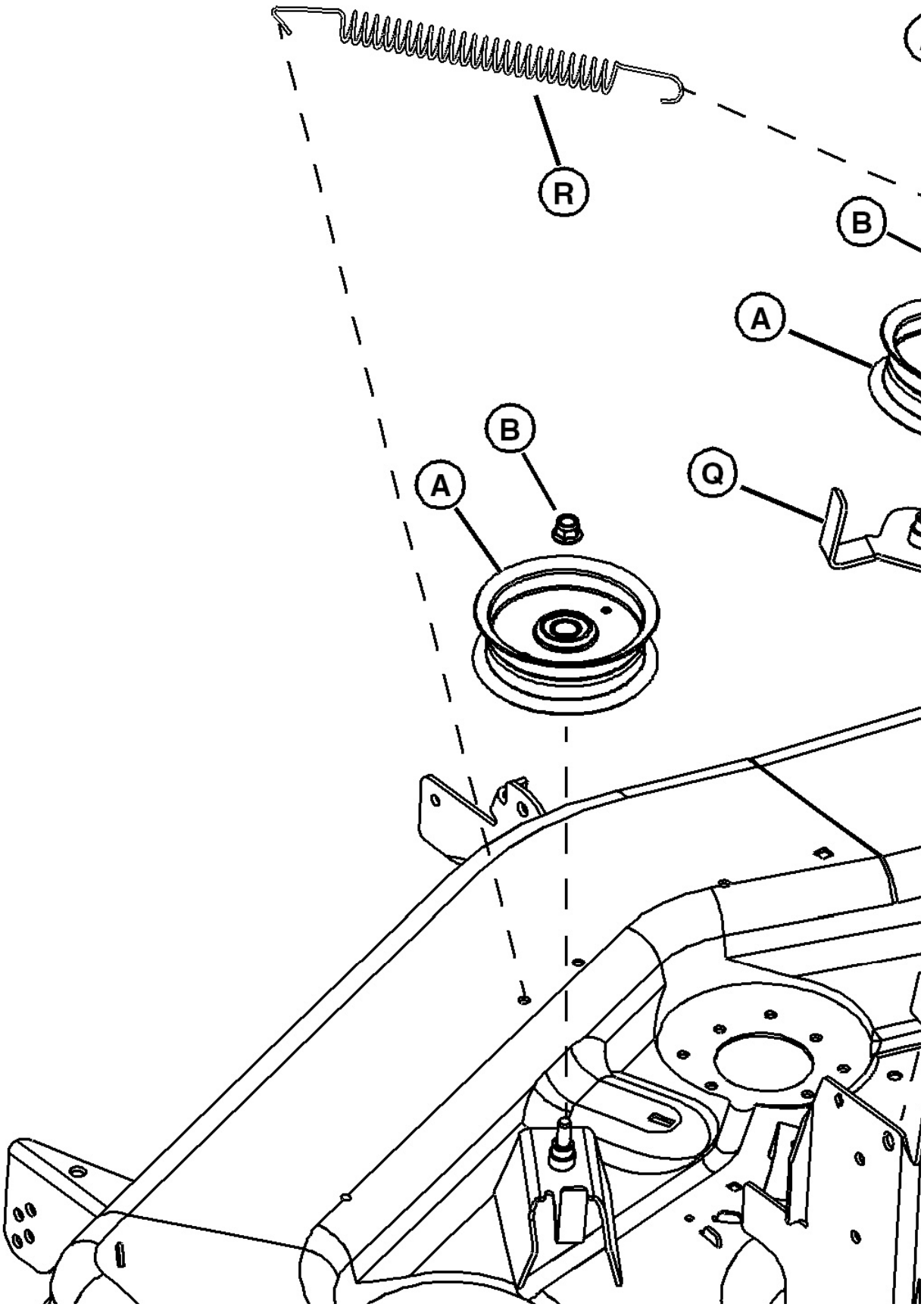
A - Gage Wheel
B - Fixed Belt Idler Sheave
C - Front Draft Arm Hanger
D - Primary Deck Drive Belt
E - Drive Belt Tensioning Spring
F - Tensioning Idler Sheave
G - Discharge Chute Hinge
H - Blade Spindle (3 used)
I - Draft Arm Attaching Bracket

NOTE:

Belt Shields removed to show belt routing.

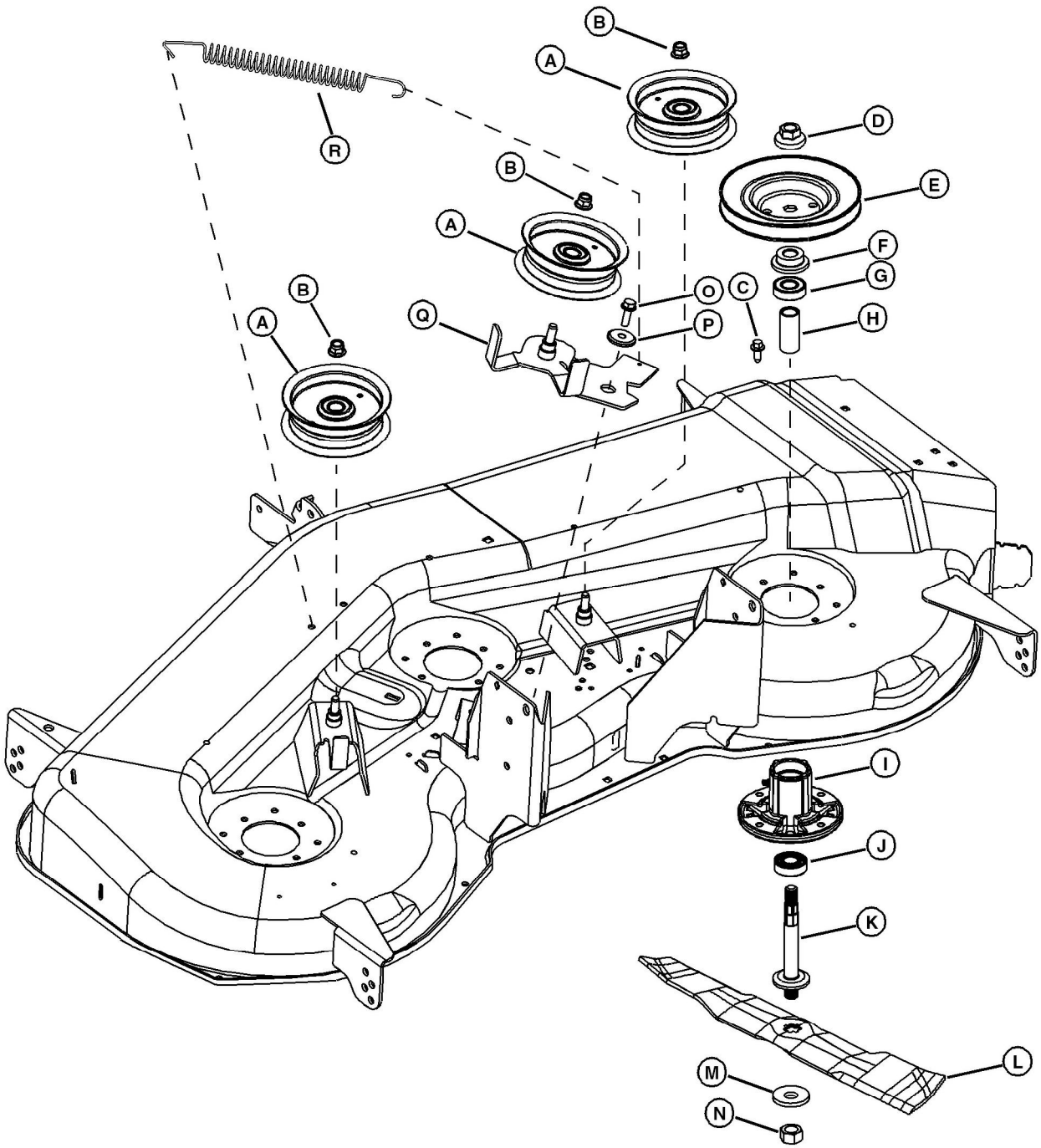

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Idlers and Sheaves - 54-Inch Deck

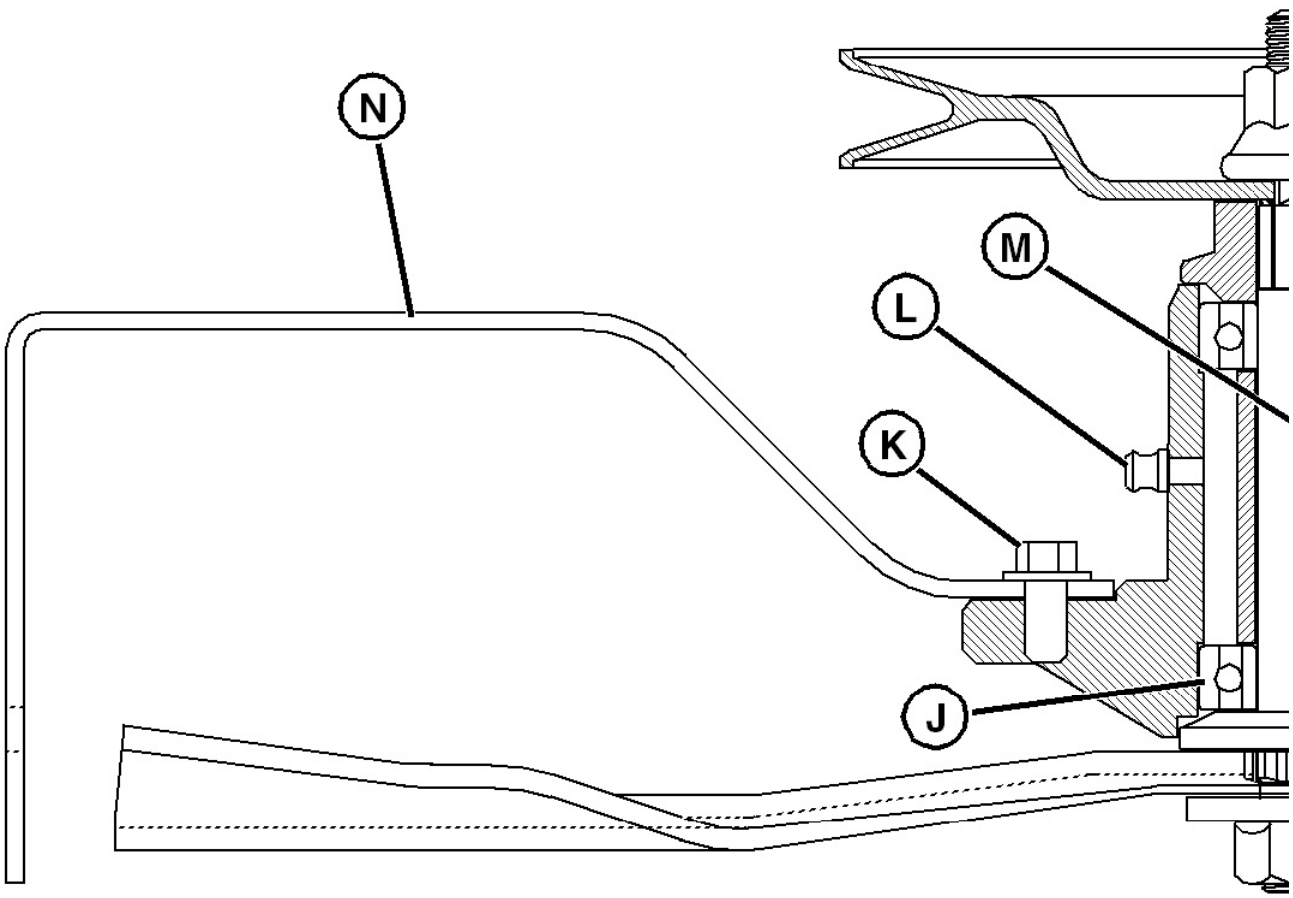

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LEGEND:

A - Idler Sheave (3 used)
B - Locking Nut (3 used)
C - Cap Screw (4 used on each spindle)
D - Spindle Nut (3 used)
E - Spindle Sheave (3 used)
F - Seal (3 used)
G - Ball Bearing (3 used)
H - Spacer (3 used)
I - Spindle (3 used)
J - Ball Bearing (3 used)
K - Blade Spindle (3 used)
L - Blade (3 used)
M - Washer (3 used)
N - Nut (3 used)
O - Cap Screw
P - Washer
Q - Idler Tensioning Bracket
R - Idler Tensioning Spring


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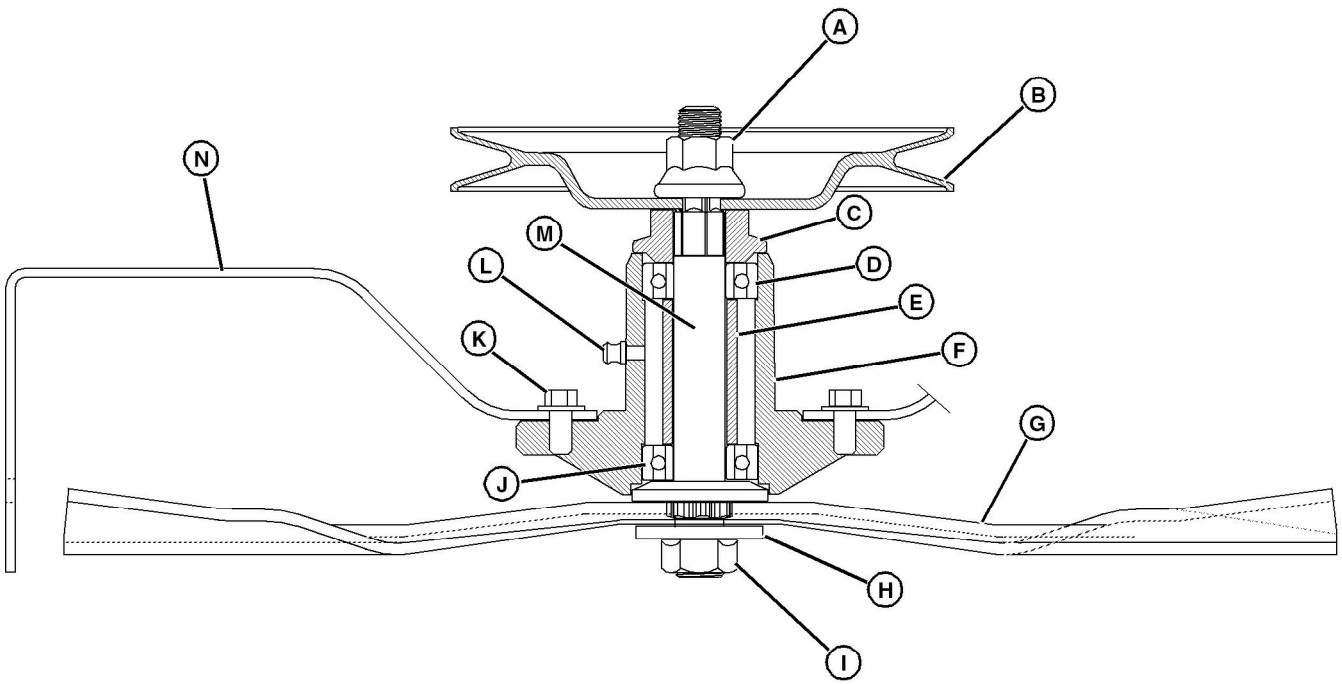
Spindle Cross Section - 54-Inch Deck



LEGEND:

A - Nut
B - Spindle Sheave
C - Upper Seal Ring
D - Upper Bearing
E - Spacer
F - Spindle Housing
G - Blade

H - Washer
I - Nut
J - Lower Bearing
K - Cap Screw
L - Lubrication Fitting
M - Spindle Shaft
N - Deck


A
B
N
C
M
D
L
E
K
F
G
J
H
I

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Mower Drive Checks

Mower Drive Checks

Test Conditions

- Machine parked on level surface
- PTO disengaged
- Parking brake locked
- Key switch in Off position

Attachment Systems Checks

1 PTO Clutch and Drive Sheave:

Action:

Is PTO clutch and drive shave tight on crankshaft? (Key not damaged or missing?)

Result:

YES: Go to next step.

NO: Tighten cap screw. Replace key if necessary.

Action:

Is air gap properly adjusted?

Result:

YES: Go to next step.

NO: Repair and adjust as needed.

Action:

Is belt on sheave?

Result:

YES: Go to next step.

NO: Install belt.

Action:

Is sheave binding, damaged or worn?

Result:

YES: Replace sheave.

NO: Go to next step.

Action:

Does sheave angle match belt angle?

Result:

YES: Go to next check.

NO: Check jack sheave and PTO sheave. Repair or replace components as necessary.

1 Primary Drive Belt: 48 and 54 Inch Decks

Action:

Is primary drive belt damaged, worn, broken or turned over?

Result:

YES: Replace primary drive belt. See Primary Drive Belt Removal and Installation .

NO: Go to next check.

1 Jack Sheave:

Action:

Is sheave binding, damaged or worn?

Result:

YES: Replace sheave.

NO: Go to next step.

Action:

Does sheave angle match belt angle?

Result:

YES: Go to next step.

NO: Check jack sheave and PTO sheave. Repair or replace components as necessary.

Action:

Is jack sheave arm binding, damaged, or worn?

Result:

YES: Replace arm.

NO: Go to next step.

Action:

Is nut at correct torque?

Result:

YES: Go to next check.

NO: Tighten nut to specification.

1 Primary Belt Tension Spring and Rod:

Action:

Is primary belt tensioning handle in tension position?

Result:

YES: Go to next step.

NO: Move to tension position.

Action:

Is primary belt tension spring or rod damaged, worn or weak?

Result:

YES: Repair or replace components as necessary.

NO: Go to next check.

1 Secondary Drive Belt:

Action:

Is secondary drive belt damaged, worn, broken or turned over?

Result:

YES: Replace belt.

NO: Go to next check.

1 Secondary Drive Belt Tensioning Spring:

Action:

Is secondary drive belt tensioning spring damaged, worn or weak?

Result:

YES: Replace spring.

NO: Go to next check.

1 Secondary Drive Belt Idler and Pivot Arm:

Action:

Is secondary drive belt idler and pivot arm binding, damaged or worn?

Result:

YES: Repair or replace components as necessary.

NO: Go to next step.

Action:

Is pivot arm bent, keeping idler from being parallel to belt?

Result:

YES: Repair or replace components as necessary.

NO: Go to next check.

1 Fixed Idler:

Action:

Is idler binding, damaged or worn?

Result:

YES: Repair or replace components as necessary.

NO: Go to next check.

1 Spindle Sheaves:

Action:

Is spindle sheave tight on spindle with key in place?

Result:

YES: Go to next step.

NO: Tighten nut and install key as needed.

Action:

Is spindle sheave damaged, bent or not running straight?

Result:

YES: Repair or replace components as necessary.

NO: Go to next step.

Action:

Does sheave angle matches belt angle?

Result:

YES: Repair or replace components as necessary.

NO: Go to next check.

1 Spindle and Housing:

Action:

Have bearings failed?

Result:

YES: Replace bearings.

NO: Go to next check.

1 Mower Deck Lift Linkage:

Action:

Is mower deck lift linkage mounting hardware tight and in good condition?

Result:

YES: Go to next check.

NO: Tighten or replace as needed.

1 Engine:

Action:

Check engine adjustments and condition. Is engine is running at correct rpm?

Result:

NO: Adjust engine fast idle and governor.

NO: Inform operator that engine should be running at fast idle when mowing.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Mower Deck Troubleshooting

Mower Deck Troubleshooting

Diagnostic Checks

1 Mower Blade Does Not Rotate:

Action:

Is the PTO clutch engaged?

Result:

NO: Engage PTO. If the PTO will not engage, refer to PTO clutch diagnostics in the Electrical section.

YES: Go to next step.

Action:

Is the primary drive belt broken, worn, frayed, glazed, or stretched?

Result:

YES: Replace belt. See appropriate belt replacement section.

NO: Go to next step.

Action:

Is the primary belt quick release belt tensioning handle locked in place?

Result:

YES: Lock handle in place.

NO: Go to next step.

Action:

Is the secondary drive belt tensioning spring weak or unhooked.

Result:

YES: Replace or reattach spring.

1 Mower Deck Vibrates:

Action:

Are blades out of balance?

Result:

YES: Balance blades. See Sharpen and Balance Blades .

NO: Go to next step.

Action:

Are blades bent?

Result:

YES: Replace blades. See Mower Blade Removal and Installation .

NO: Go to next step.

Action:

Are drive sheaves damaged?

Result:

YES: Replace drive sheave(s).

1 Mower Deck Cuts Unevenly or with Striping:

Action:

Are blades dull?

Result:

YES: Sharpen blades. See Sharpen and Balance Blades .

NO: Go to next step.

Action:

Is the deck level side-to-side and front-to-back? See Checking Mower Level .

Result:

YES: Go to next step.

NO: Level mower deck side-to-side and/or front-to-back.

Action:

Are gage wheels adjusted properly?

Result:

YES: Go to next step.

NO: Adjust gage wheels. See Adjusting Mower Deck Wheels .

Action:

Are blades bent?

Result:

YES: Replace blades. See .

NO: Go to next step.

Action:

Are drive sheaves damaged?

Result:

YES: Replace drive sheave(s).

1 Mower Belt Slips or Jumps Off Sheaves:

Action:

Is the primary belt quick release belt tensioning handle locked in place?

Result:

YES: Go to next step.

NO: Lock handle in place.

Action:

Is the primary drive belt broken, worn, frayed, glazed, or stretched?

Result:

YES: Replace belt. See appropriate belt replacement section.

NO: Go to next step.

Action:

Is the secondary drive belt broken, worn, frayed, glazed, or stretched?

Result:

YES: Replace belt.

NO: Go to next step.

Action:

Is the secondary drive belt tensioning spring weak or unhooked.

Result:

YES: Replace or reattach spring.

NO: Go to next step.

Action:

Are drive sheaves damaged?

Result:

YES: Replace drive sheave(s).

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tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Checking Mower Level

Checking Mower Level

CAUTION:

Rotating blades are dangerous. Before adjusting or servicing mower:

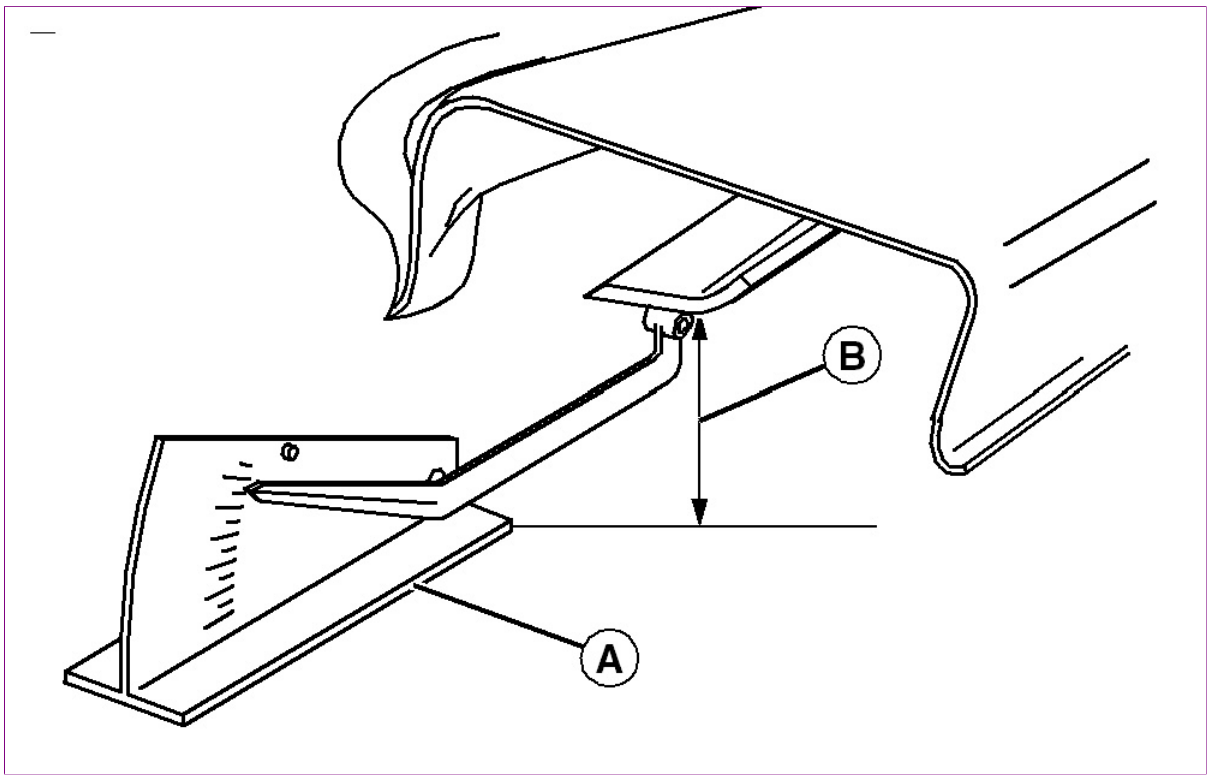
- ***Disconnect spark plug wire(s) to prevent engine from starting accidently.***
- ***Always wear gloves when handling mower blades or working near blades.***

NOTE:

Mower wheels should not contact the ground when leveling the deck.

Procedure:

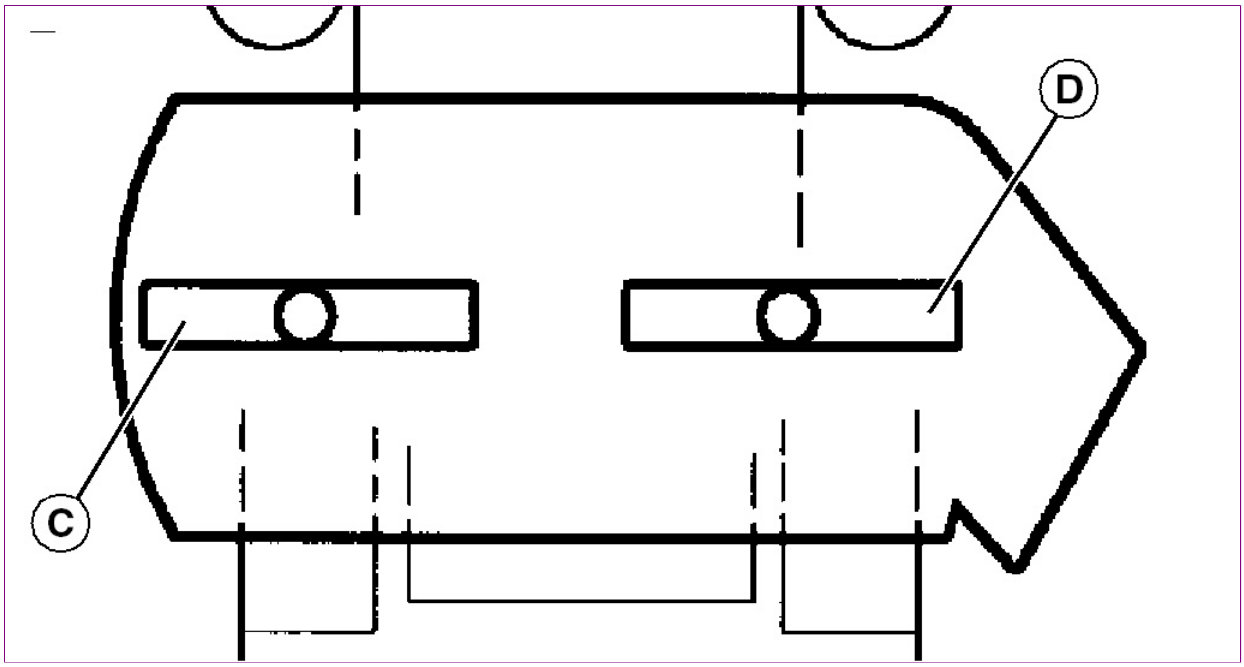
1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Check and set tire pressures to **97 kPa (14 psi)** front tires and **69 kPa (10 psi)** rear tires.
3. Move mower lift handle to preferred cutting height.
4. Measure mower level (side-to-side).

a. 

MXML2008120217101287-UN: Leveling gauge (A) (AM130907) is available from your John Deere dealer.

Position mower blades as follows and measure from each outside blade tip (B) to the level surface:

b.

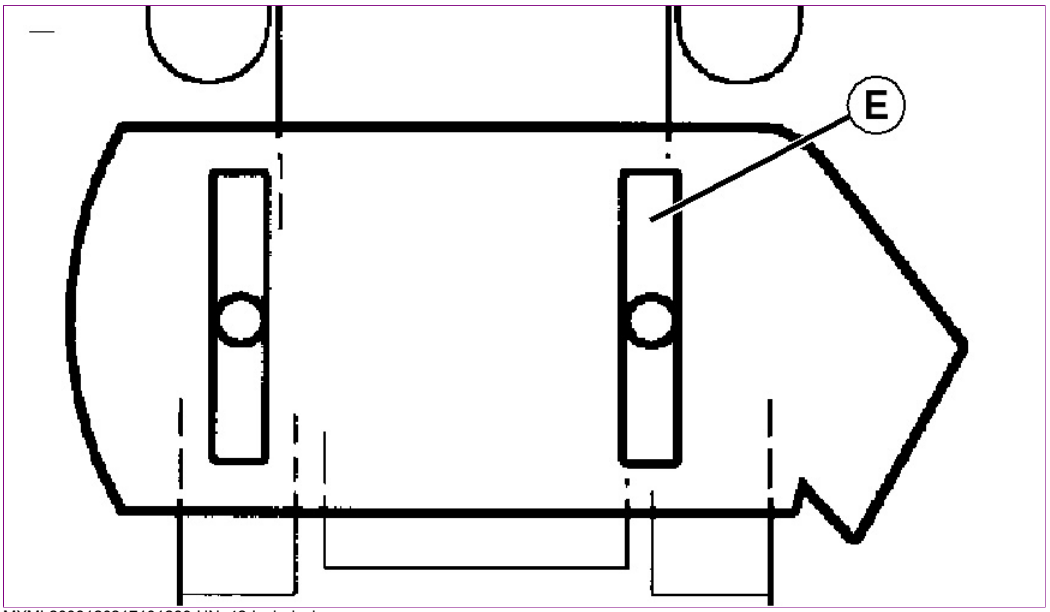


MXML2008120217101288-UN: 42-Inch deck

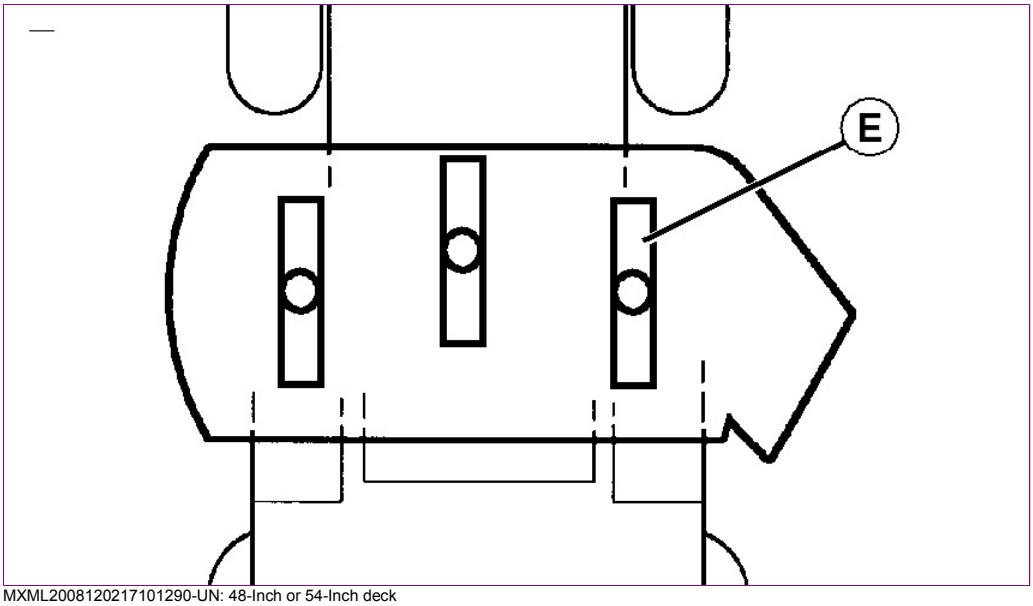
Turn left blade (C) as shown. Hold drive belt and turn right blade (D) as shown (Hold drive belt and also turn center blade on 48-inch models). Take measurement for all blades. The difference between blade measurements must not be more than **3 mm (1/8 in.)** .

c. Adjust mower level, if necessary.

5. Measure mower level (front-to-rear).



MXML2008120217101289-UN: 42-Inch deck



MXML2008120217101290-UN: 48-Inch or 54-Inch deck

a. Turn right blade (E) so blade tip points straight forward.
b. Measure from blade tip to the surface. Take measurement for all blades.

   Front blade tip must be **3 - 6 mm (0.12 - 0.24 in.)** lower than rear blade tip.

c. Adjust mower level, if necessary.

---

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Adjusting Mower Level

Adjusting Mower Level

CAUTION:

Rotating blades are dangerous. Before adjusting or servicing mower:

- ***Disconnect spark plug wire(s) to prevent engine from starting accidently.***
- ***Always wear gloves when handling mower blades or working near blades.***

IMPORTANT:

Always perform primary drive belt tension adjustment (42-Inch only) after leveling deck.

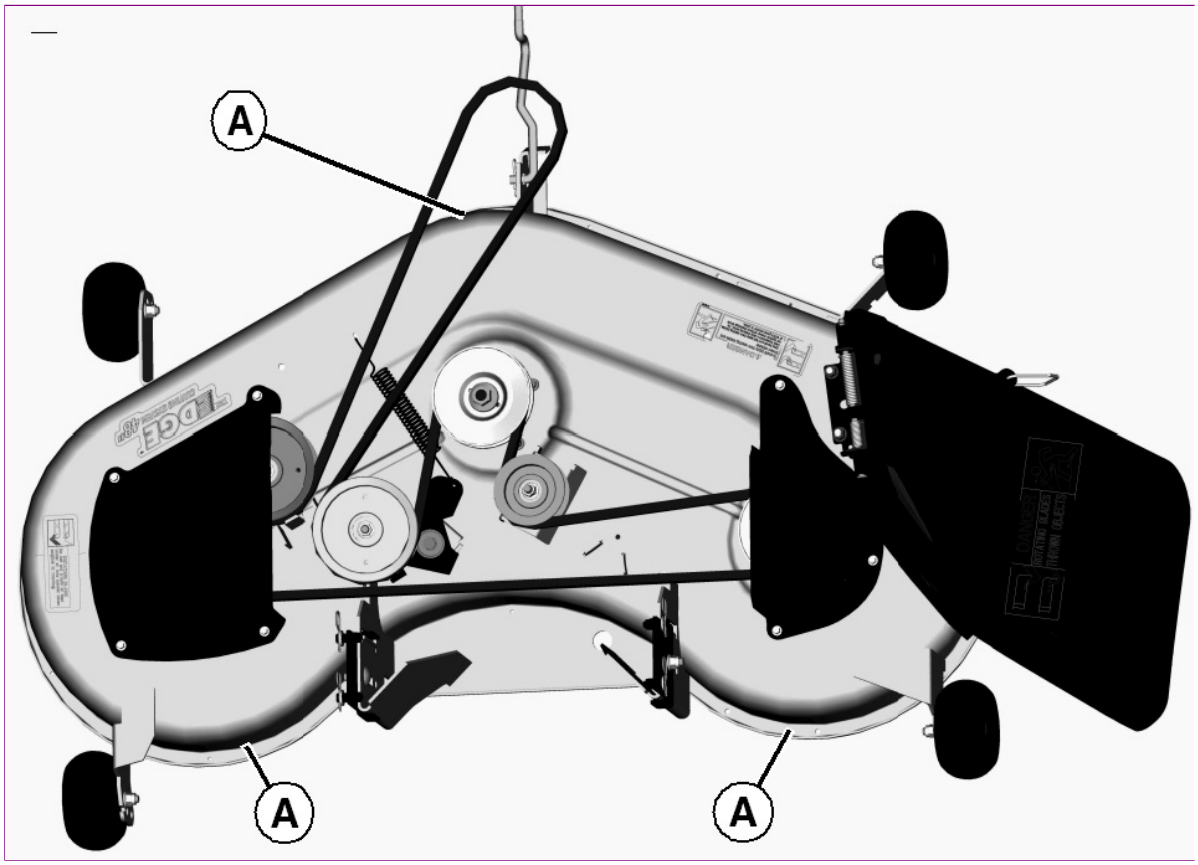
NOTE:

Mower wheels should not contact the ground when leveling the deck.

Conditions:

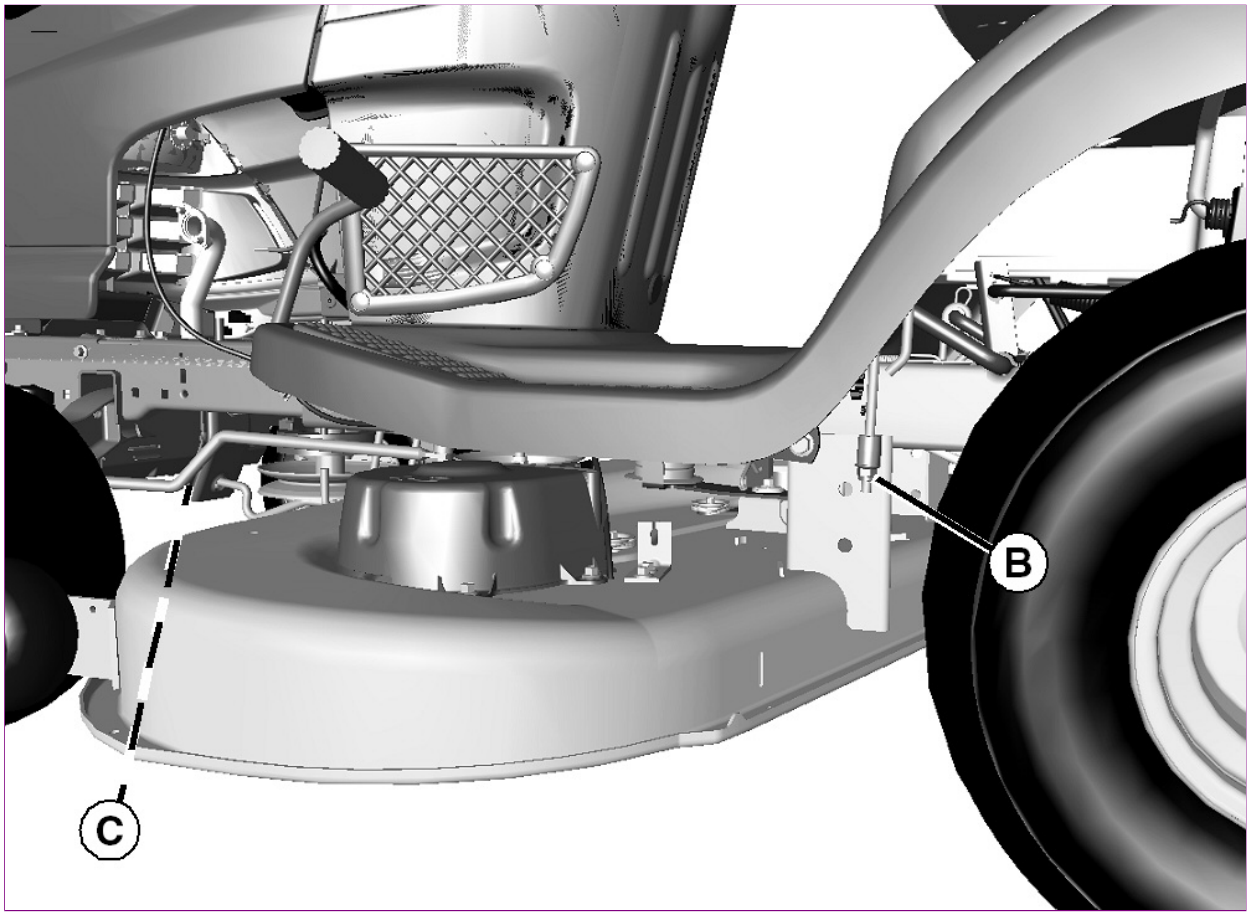
- PTO Disengaged
- Tire Pressures Checked and Set
- Parking Brake Locked

Procedure:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Check and set all tire pressures.
3. Raise mower deck to highest position.
4. 

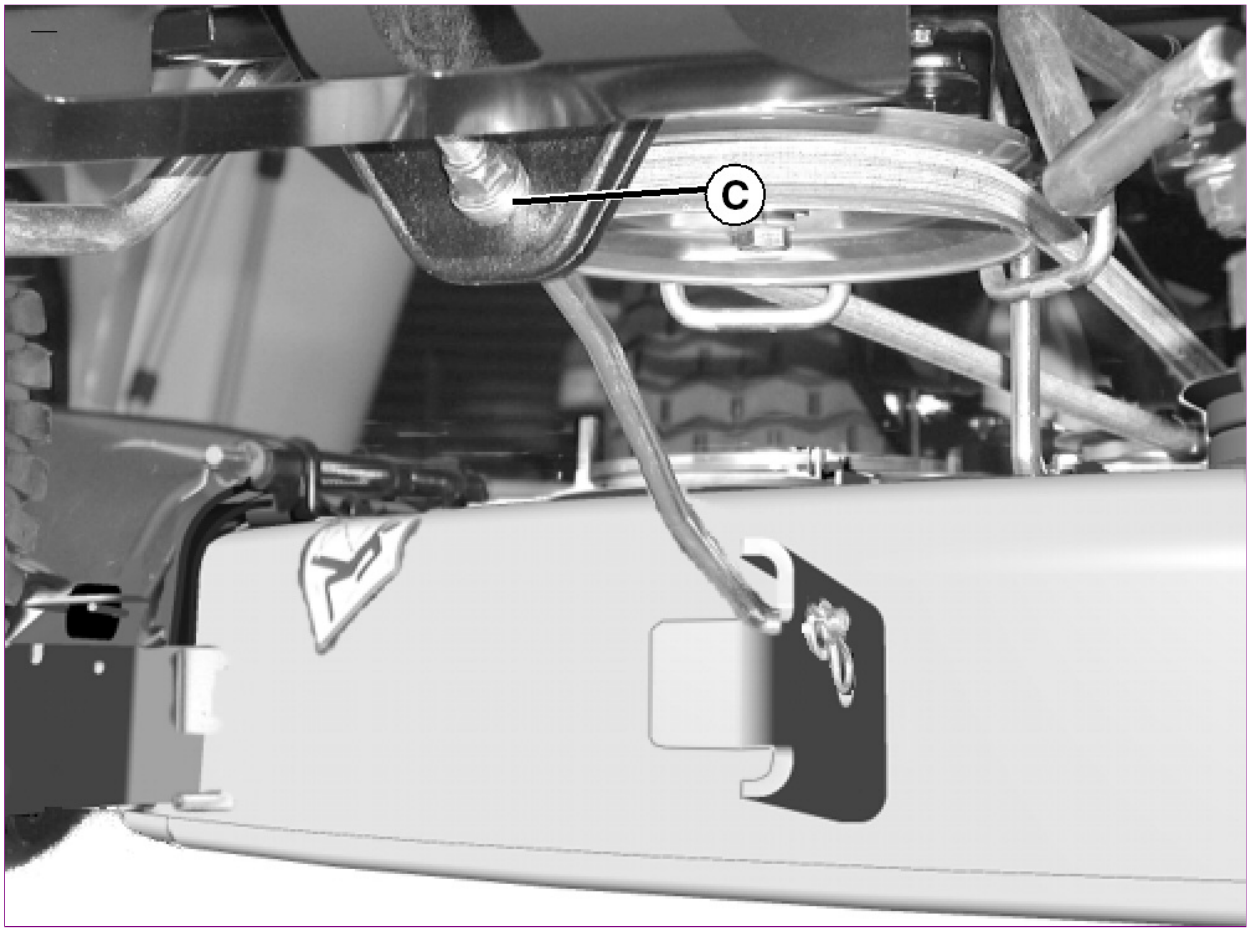
MXML2008120217101291-UN: 48-Inch deck used for illustration.

   Place a straight 2x4 piece of wood (A) or a **38 mm (1.5 in.)** thick block under the edges (A) of mower deck.
   - Shims can be added, on both sides, between block of wood and mower deck edge to obtain a specific deck height, if desired.
5. Lower mower deck to the 50.8 mm (2 in.) cutting height position, bringing deck down onto blocks.
6. Check that blocks are positioned under each edge. Make sure blocks do not interfere with gage wheels.
7. Check that there is no tension on the front draft arm. If necessary, loosen adjusting nut on front draft arm so front of deck rests lightly on wood blocks.



MXML2008120217101292-UN: 42-Inch deck shown.

If the rear of the deck is not touching the rear blocks, or is sitting heavily on the blocks, adjust the rear links by turning the leveling nut (B) on each lift link. The blocks should be able to easily slide in and out beneath the deck when deck is correctly adjusted.



MXML2008120217101293-UN: 42-Inch deck shown.

If front of the deck is not lightly touching the front block, adjust the front draft arm by turning the nut (C).

8. Raise the cutting height to the next higher position and remove the three wooden blocks.
9. *NOTE:*

   The front blade tip must be lower than the rear blade tip.

   Turn the nut (C) on the front draft arm counterclockwise 1 - 2 full turns so that the front of the deck is 3 - 6 mm (0.12 - 0.24 in.) lower than the rear.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Spindle Brake Adjustment - 42-Inch

Spindle Brake Adjustment - 42-Inch

Procedure:

CAUTION:

Rotating blades are dangerous. Mower blades must stop within 5 seconds after mower is turned off.

IMPORTANT:

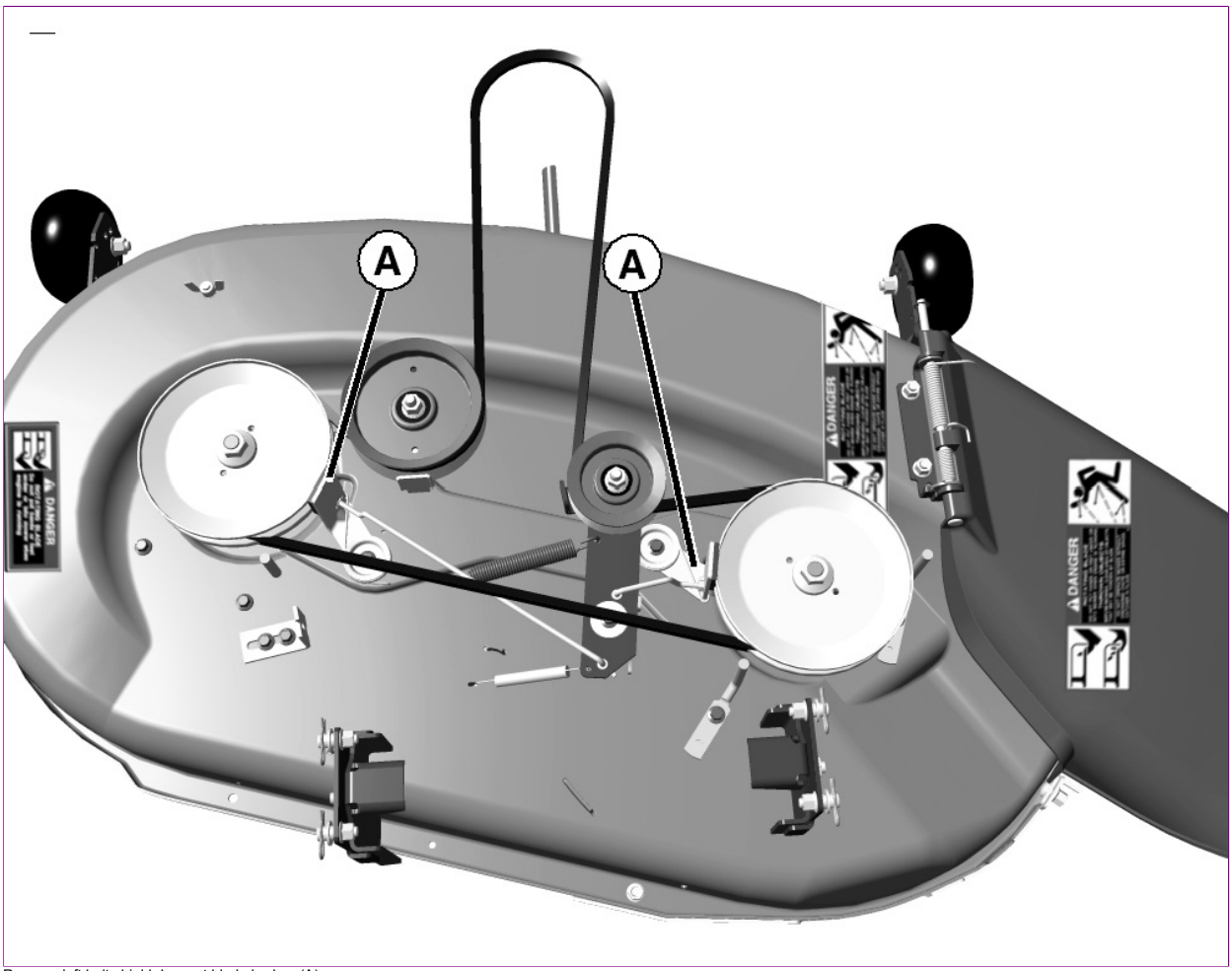
Avoid belt damage.

Spindle brake engagement should be checked and corrected every time the mower belt tension is adjusted.

Mower belt tension should be adjusted, if required, before brakes are adjusted.

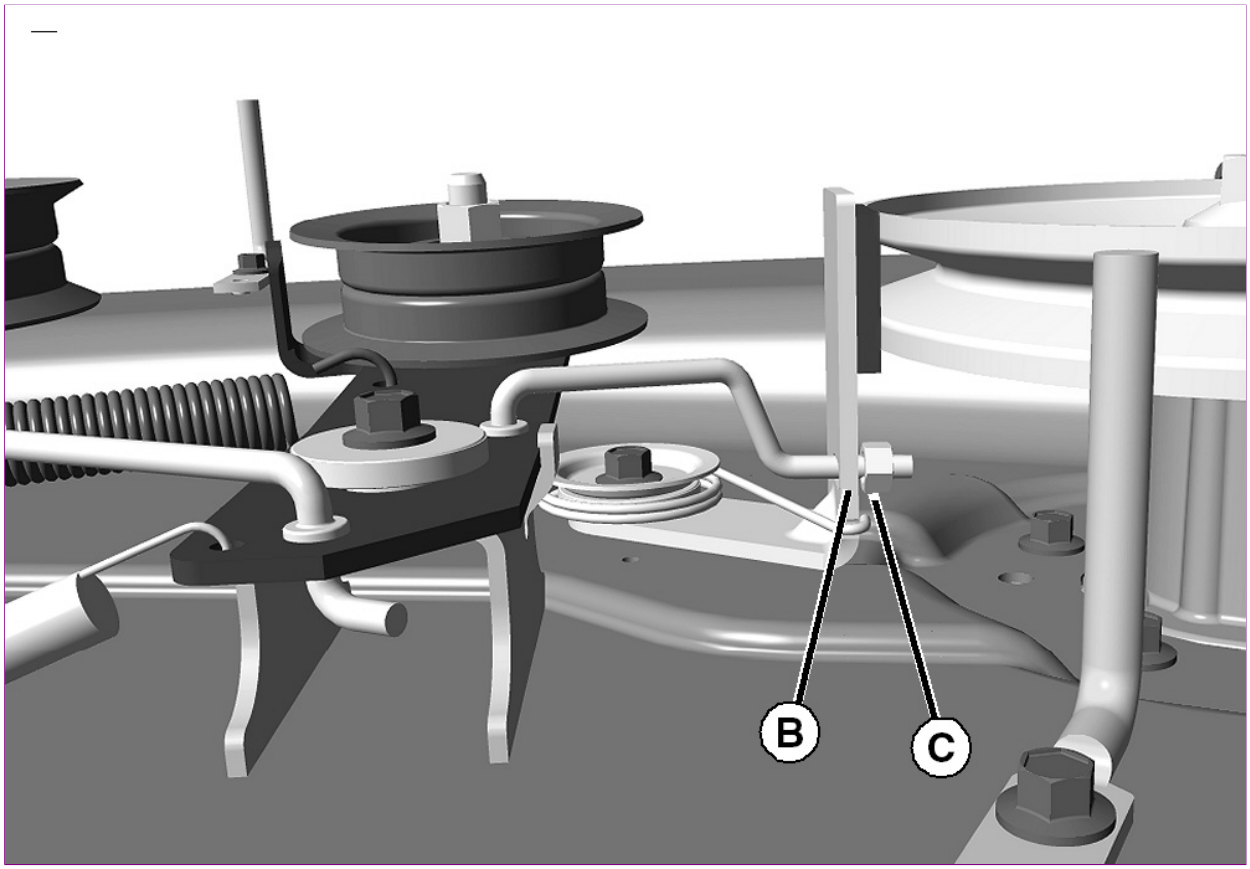
1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Remove wire from spark plug to prevent accidental starting.
3. Remove mower deck. See Removing Mower Deck .
4. **IMPORTANT:**

   There are two spindle brakes on the 42-Inch deck. Both brakes must be adjusted for proper functioning of spindle braking.



Remove left belt shield. Inspect blade brakes (A).

- Inspect and measure thickness of brake pads including the backing plate. If less than specification replace brake. See Blade Brake Removal and Installation .



- Measure distance from spindle brake bracket (B) to nut (C) on end of brake rod. Bracket to nut distance should be to specification.
- If adjustment is required, turn nut (C) on end of brake rod in correct direction to set brake at proper distance from pulley.

5. Install left belt shield.
6. Install mower deck.

Item	Measurement	Specification
Specifications:		
Brake Pad Thickness (minimum)		5.1 mm 0.2 in.)
Brake Bracket to Nut Gap		2 - 3 mm 0.08 - 0.12 in.)

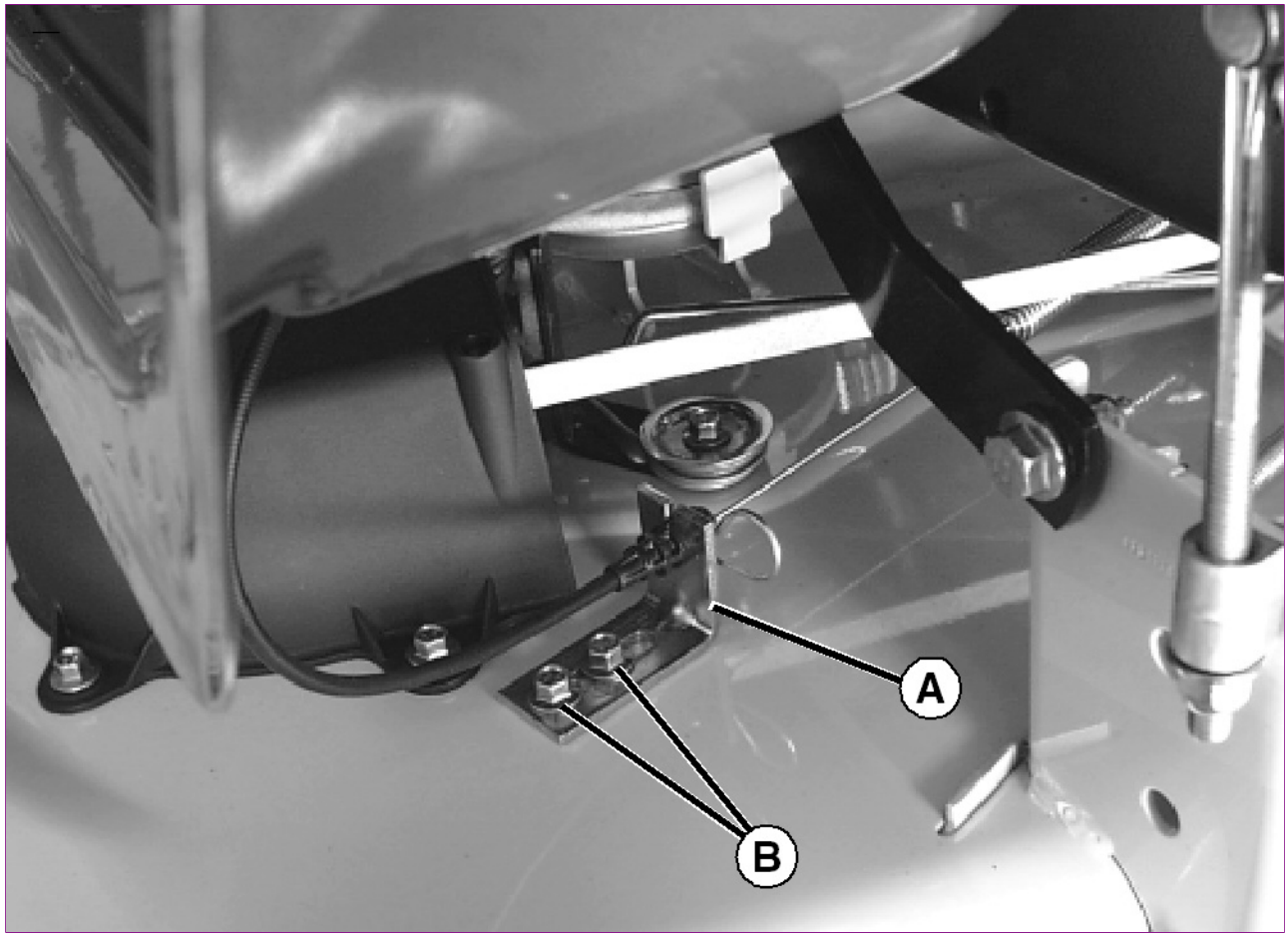
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Mower Belt Tension Adjustment - 42-Inch

Mower Belt Tension Adjustment - 42-Inch

Conditions:

- PTO Disengaged
- Cutting Height Set to 25 mm (1 in.)
- Drive Belt in Good Condition

Procedure:

1. Position machine on level surface. Stop engine. Remove key. Wait for all moving parts to stop.
2. 

With PTO in off position, loosen self-tapping screws (B), and move bracket (A) towards machine frame to loosen belt tension or away from frame to increase belt tension.
3. Move bracket until almost all slack is out of cable but cable is not too tight. Tighten screws.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Adjusting Mower Deck Wheels

Adjusting Mower Deck Wheels

Procedure:

CAUTION:

Rotating blades are dangerous. Before adjusting or servicing mower:

- ***Disconnect spark plug wire(s) to prevent engine from starting accidently.***
- ***Always wear gloves when handling mower blades or working near blades.***

IMPORTANT:

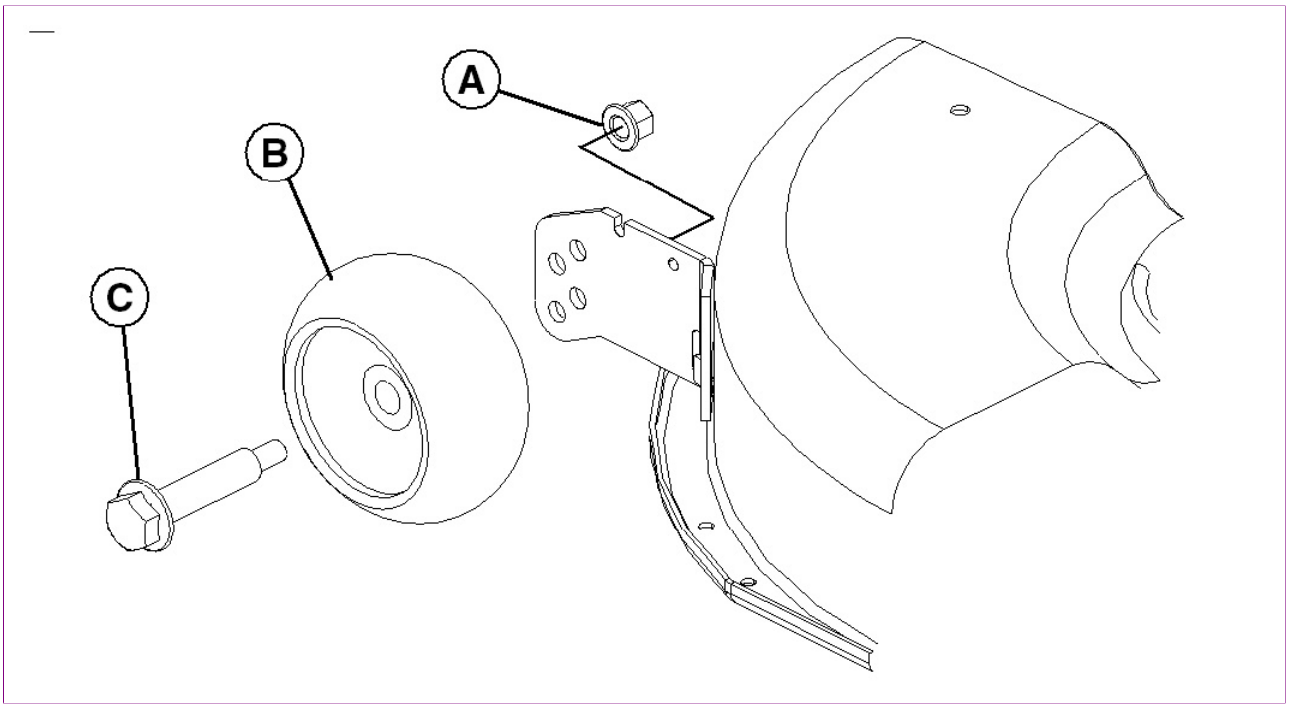
The mower deck can be damaged if mower wheels are adjusted wrong:

- **Wheels must not ride on ground supporting mower weight.**
- **Check wheel adjustment each time cutting height is changed.**

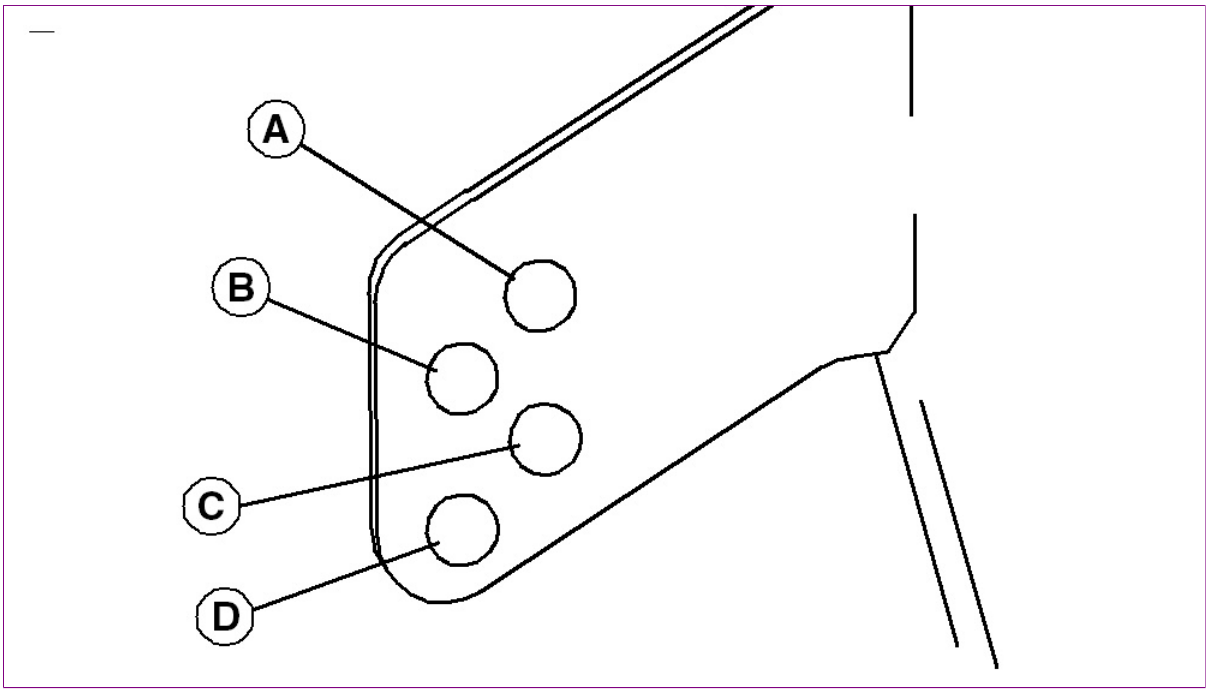
1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Inflate tires to the correct pressure.
3. *NOTE:*

   Bottom of wheels should be approximately 3-13 mm (1/8-1/2 in.) from the ground.

   Lower mower deck to the desired mowing position.



4. Check mower wheel position. Remove nut (A) and bolt (C) on all wheels and move wheels (B) with bushing (D) to proper hole.

5. 

LEGEND:

A - 38 mm (1.5-in.)
B - 51 mm (2-in.)
C - 64 mm (2.5-in.)
D - 76 mm (3-in.) and above

Install bolts and/or nuts to lock wheels in position. Tighten nuts to specification.

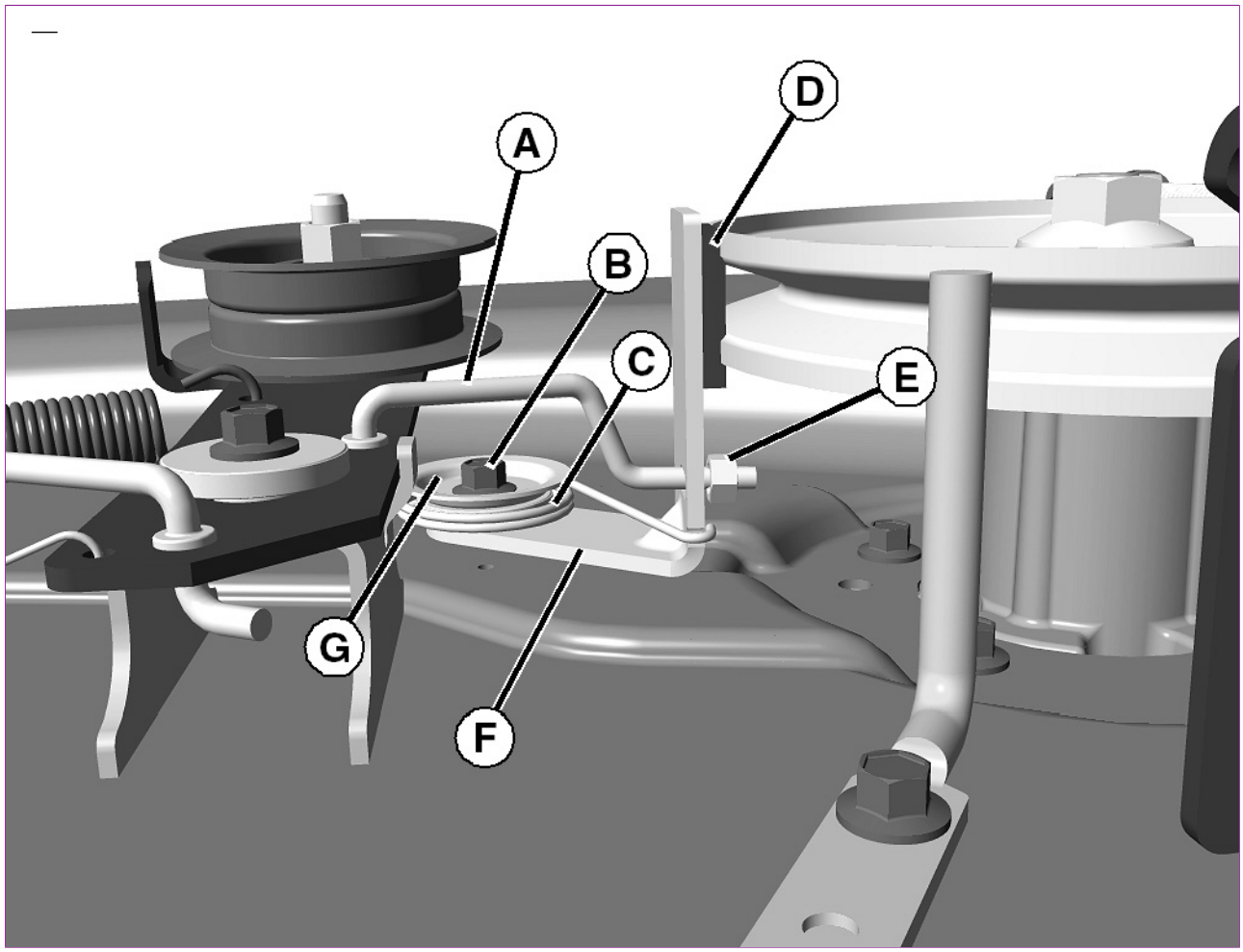
Item	Measurement	Specification
Specification:		
Wheel Bolt Nut		34 N•m 25 lb-ft)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Blade Brake Removal and Installation - 42-Inch

Blade Brake Removal and Installation - 42-Inch

Removal:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Disengage PTO lever.
3. Remove mower deck. See Removing Mower Deck .

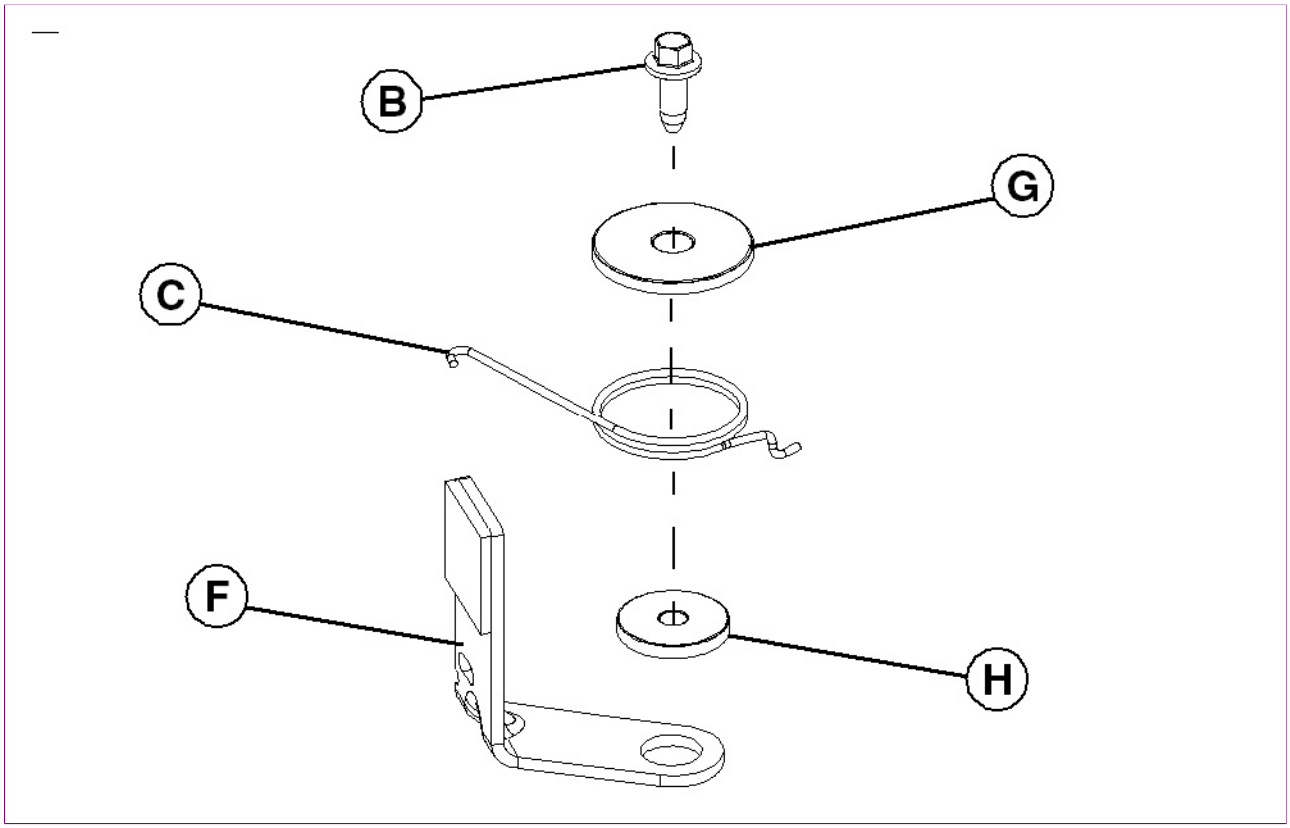


4. Inspect spindle brake pads (D) for wear. Minimum thickness of each brake pad is **5 mm (0.197 in.)** including backing plate.
5. If brake(s) must be replaced, remove nut (E) on brake rod (A).
6.

> ***CAUTION:***
>
> ***Remove spring loaded sheave brake assembly with care. Spring is loaded and under tension.***

   Remove bolt (B), washer (G), and spring (C) holding sheave brake arm (F) to deck.
7. Inspect sheave brake assembly for brake pad thickness and other wear or damage.

Installation:



1. *NOTE:*

   Clean sheave with brake cleaner to ensure surface is free of dirt or grease.

   Install spring (C) in position on deck.
2. Put bushing (H), spring (C), washer (G), and bolt (B) onto brake arm (F).
3. Rotate arm and spring assembly, while tightening bolt (B) to **27 N•m (20 lb-ft)** .
4. Install brake rod (A) through brake arm (F) and install nut (E) on end of brake rod.
5. Adjust brake. See Blade Brake Adjustment - 42-Inch .

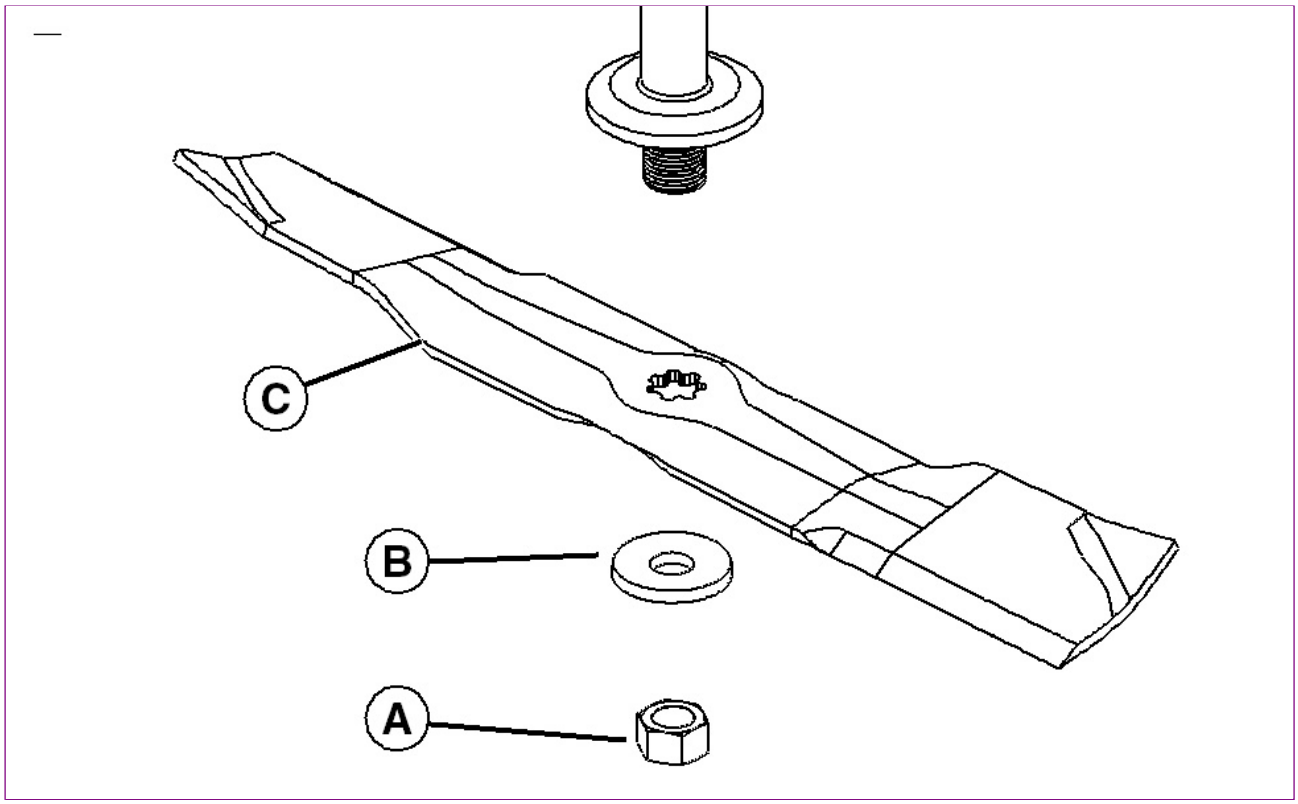
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Mower Blade Removal and Installation

Mower Blade Removal and Installation

CAUTION:

Mower blades are sharp. Always wear gloves when handling mower blades or working near blades.

Blade Removal:

1. Raise mower to gain access to mower blades. If necessary, remove mower. See Removing Mower Deck .
2. Using a wooden block, prevent mower blades from spinning.
3. 

Loosen nut (A).
4. Remove nut (A), blade washer (B) and blade (C).
5. Inspect blades; sharpen/balance or replace as necessary.

Blade Installation:

1. Position mower blade, with cutting edge towards ground, onto mower spindle.
2. Install blade washer (B).
3. Install and tighten nut (A) by hand until mower blade is in full contact (fully seated) with spindle.
4. With mower blade blocked to prevent spinning, tighten nut (A) to specification.

Item	Measurement	Specification
Specifications:		
Blade Nut Torque (with M12 Nut)		75 N•m 55 lb-ft)
Blade Nut Torque (with 5/8 in. Nut)		88 N•m 65 lb-ft)

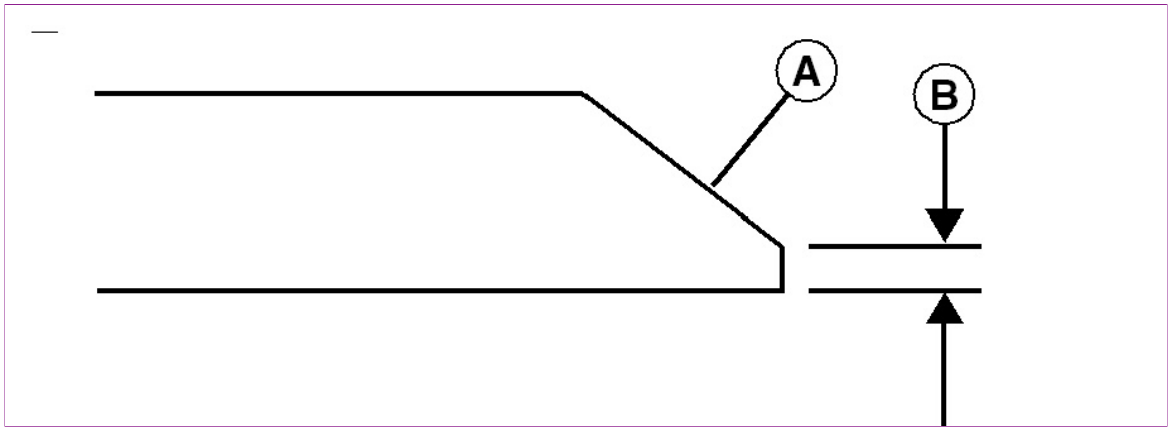
Sharpen and Balance Blades

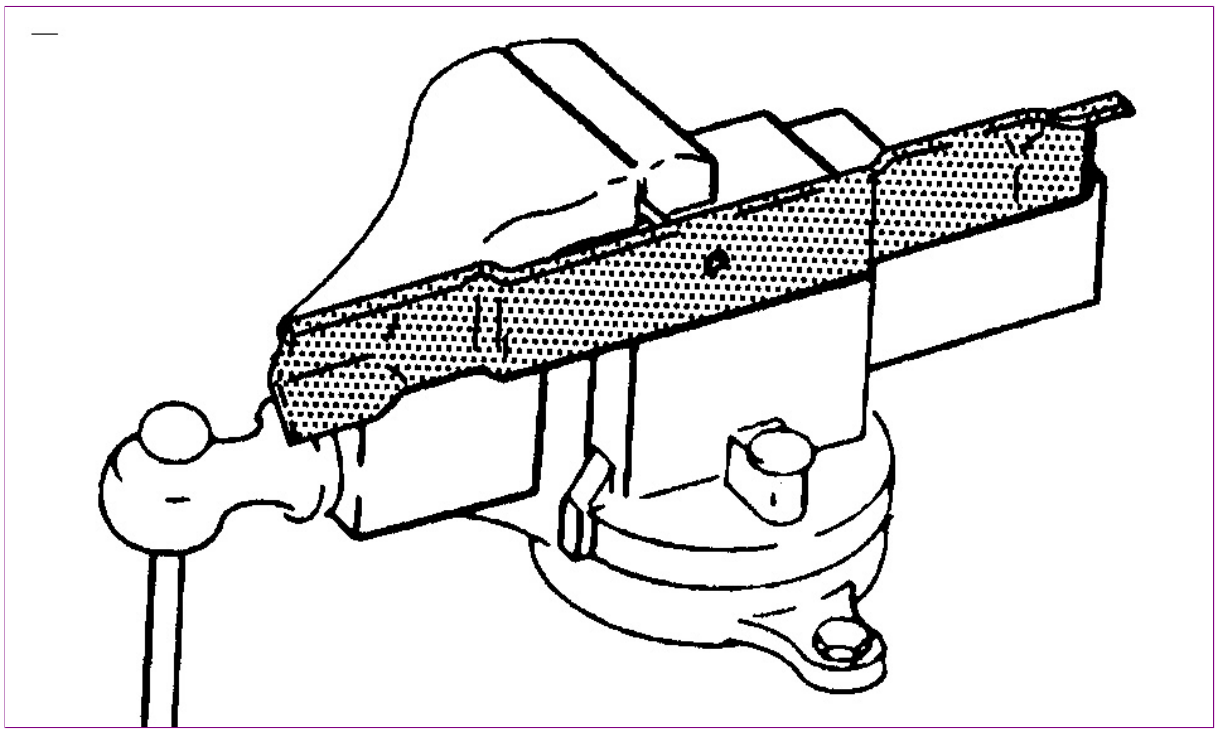
Procedure:

1. ***CAUTION:***

   Blades are sharp. Always wear gloves when handling blades or working near blades.

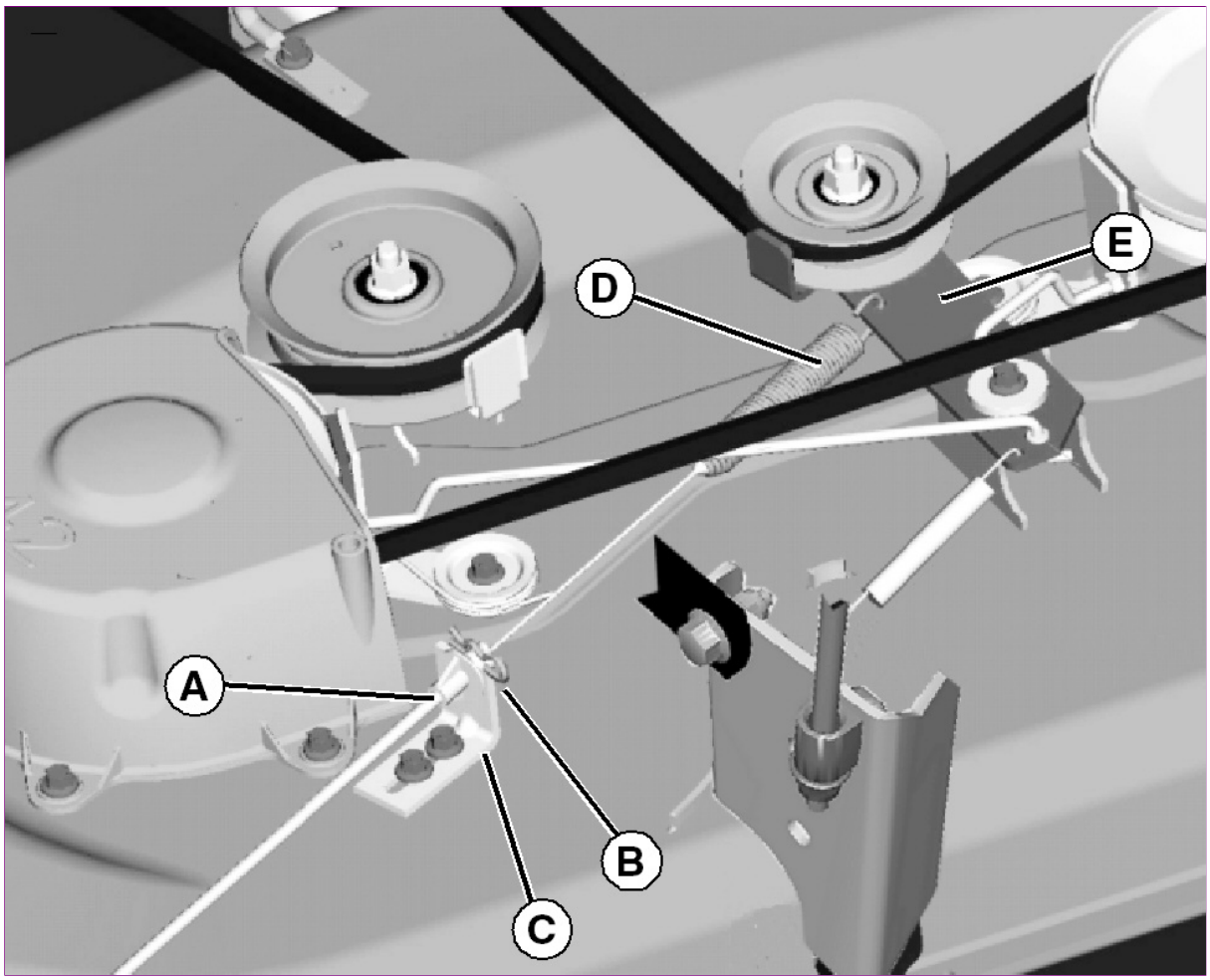
   Always wear safety eye protection when grinding.

   Clean blade.
2. Sharpen blade using grinder, file or power sharpener.
3. 

   Do not alter original bevel (A). Blade should have **0.40 mm (0.016 in.)** cutting edge (B) rather than a razor - type edge.
4. 
   Put blade on nail in a vise or vertical wall stud.
5. Turn blade to horizontal position. If the blade is not balanced, the heavy end will drop.
6. Grind blade edge of heavy end. Do not change blade bevel angle.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Removing Mower Deck

Removing Mower Deck

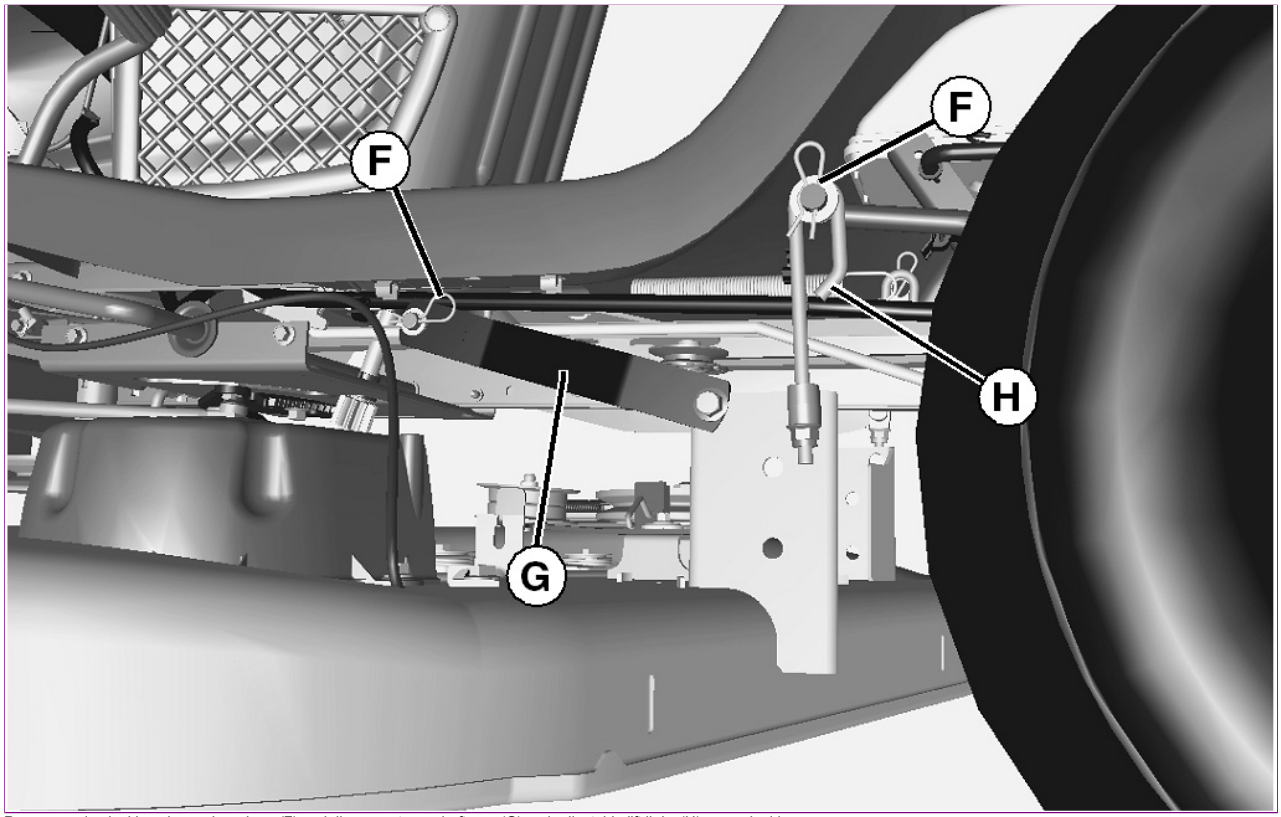
1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Put wood blocks under each side of mower deck.
3. Put attachment lift lever in lowest position, bringing deck down onto blocks.
4. 

MXML2008120217111304-UN: 42-inch mower deck only.

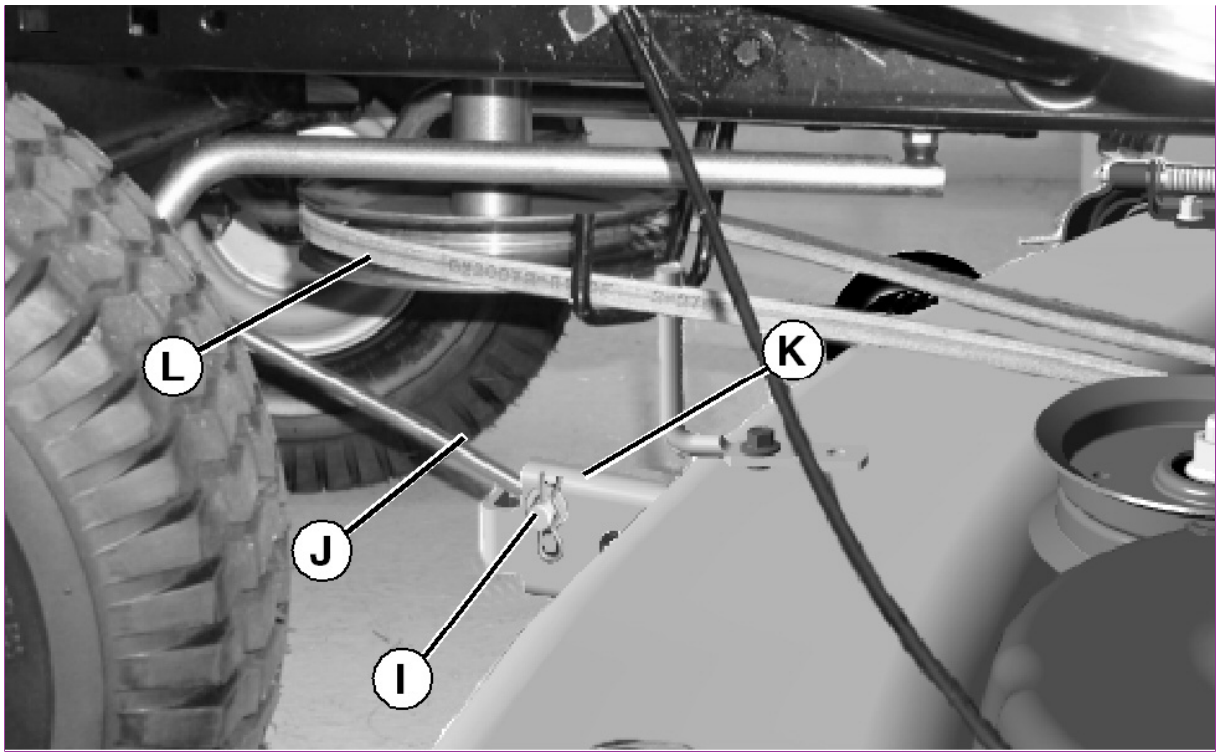
   On machines with 42-inch mower deck, disconnect mower engagement drive cable (A) on left side of mower deck.
   - Remove spring locking pin (B), pull and hold mower engagement drive cable out, lift up and remove from bracket (C).
   - Remove cable spring (D) from idler sheave bracket (E).
5. ***CAUTION:***

   Mower lift arms can pinch fingers. Lift arms are spring loaded and can snap back when deck is removed.

   Lock lift lever before pulling pin to remove mower deck.

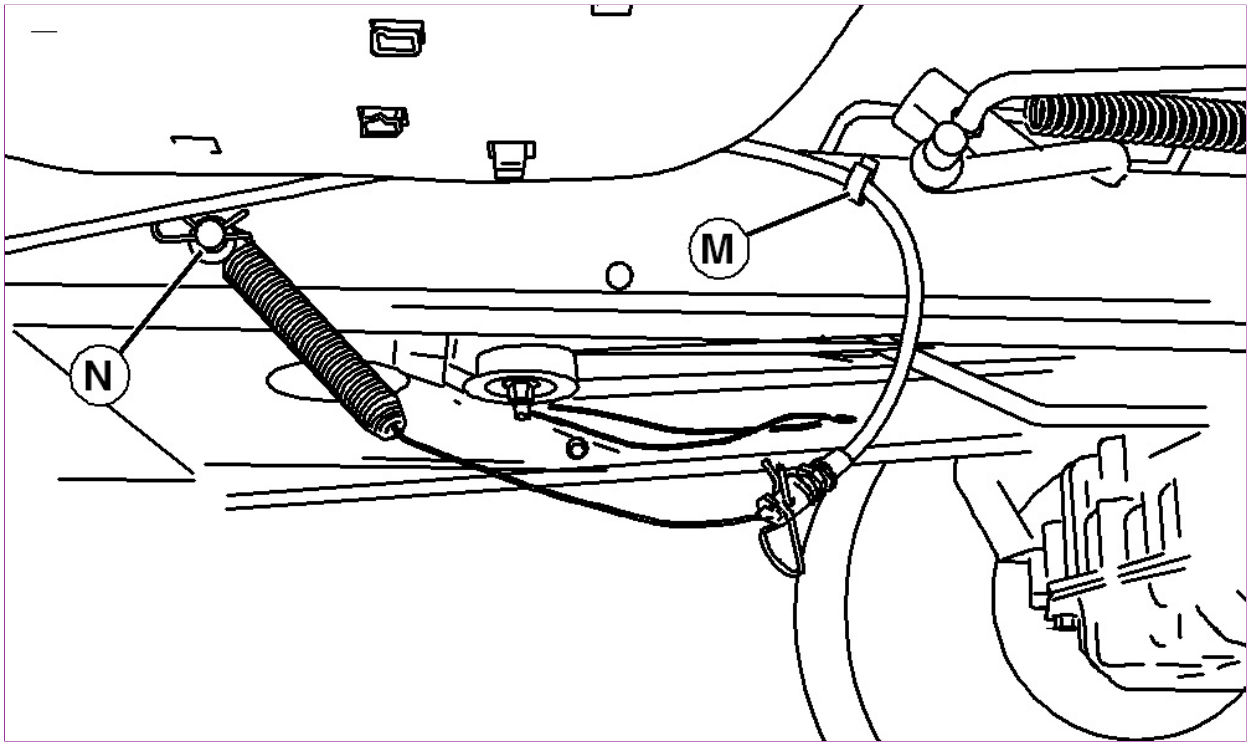


Remove spring locking pins and washers (F) and disconnect rear draft arm (G) and adjustable lift links (H) on each side.



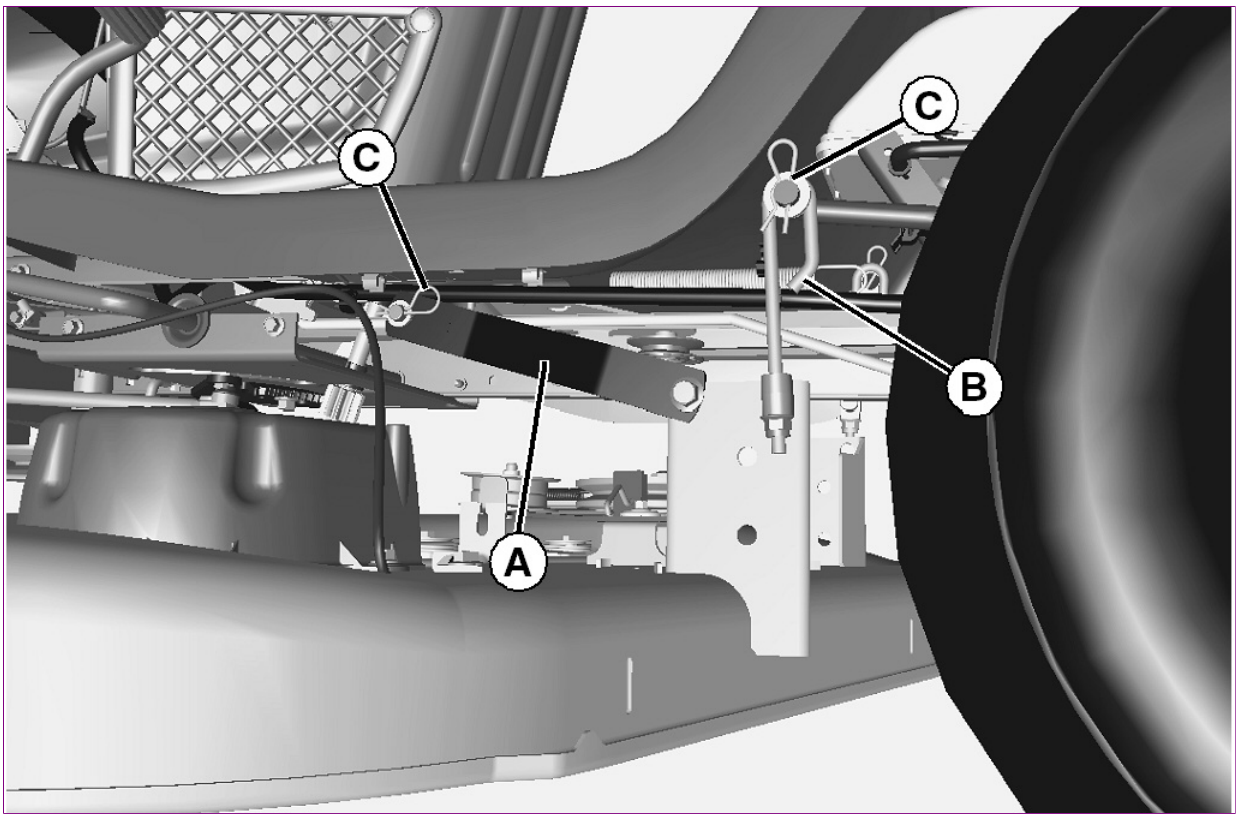
6. MXML2008120217111306-UN: 107 cm (42 in.) mower deck shown.

   Remove spring locking pin and washer (I) and front draft rod (J) from mower deck bracket (K).
7. Remove mower drive belt from drive sheave (L).
8. Remove wood blocks from both sides and slide mower out from under the machine.
9. When operating the machine without the mower deck:
   - Remove front draft rod from tractor and attach it to the mower deck.

- 

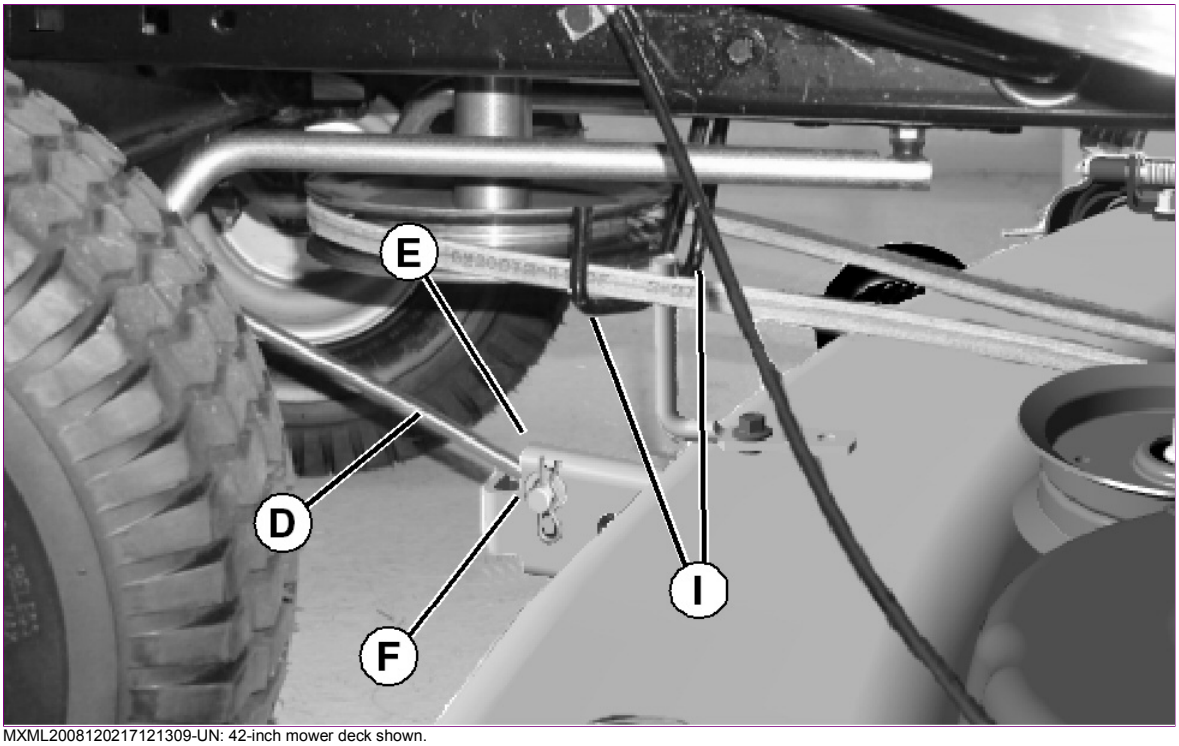
On 42-inch mower deck only: Push mower engagement drive cable into clip (M) and hook end of cable spring with hardware (N) into peg on left side of machine frame.

Installing Mower Deck

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Put attachment lift lever in the transport position.
3. Slide mower under machine.
4. Put wood blocks under each side of mower deck.
5. Put attachment lift lever in lowest position.
6. 

Fasten rear draft arm (A) and adjustable lift link (B), on each side, with washers and spring locking pins (C).
7. **IMPORTANT:**

   To prevent clutch damage, make sure front draft rod is installed correctly. Secure rod with washer and spring locking pin on the left side of mower deck bracket.

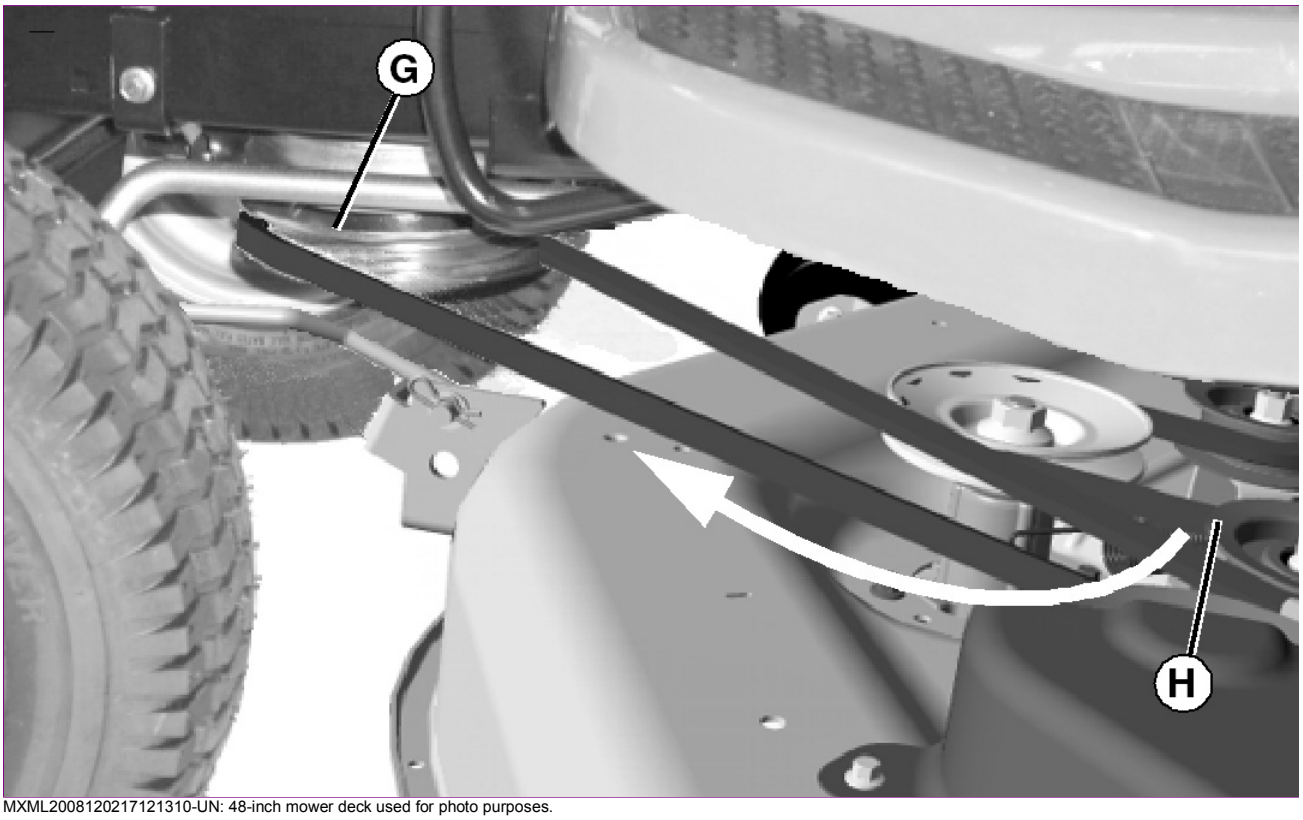


MXML2008120217121309-UN: 42-inch mower deck shown.

8. Install front draft rod (D) into mower deck bracket (E) and secure with washer and spring locking pin (F) on the left side of bracket as shown.

CAUTION:

Idler arm is under load when removing or installing a new belt. Injury can occur if released suddenly. Keep hands and fingers from the surrounding area of the arm.



MXML2008120217121310-UN: 48-inch mower deck used for photo purposes.

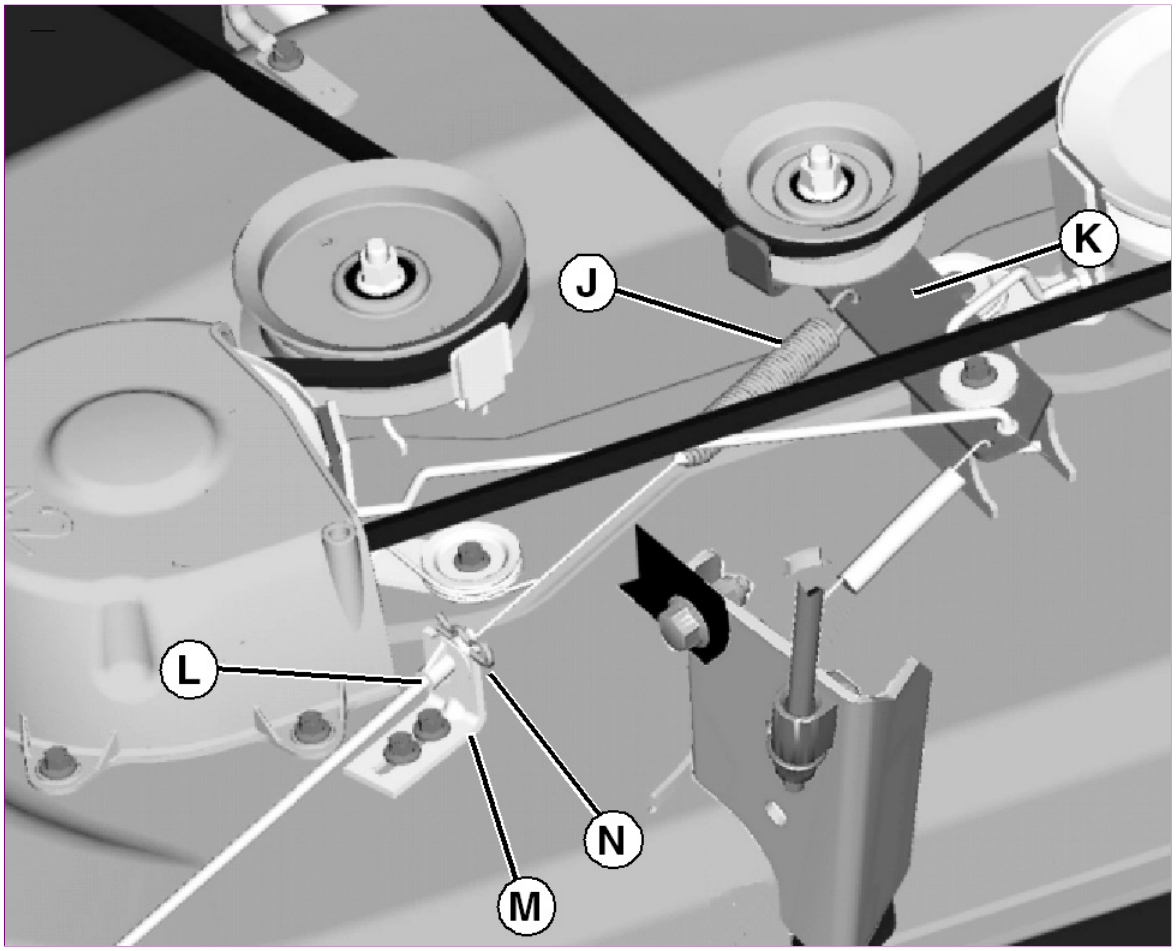
Put mower drive belt on engine drive sheave (G).

- On 48-inch and 54-inch mower decks: Put a 15 mm closed wrench or a socket on the idler sheave nut (H) and rotate clockwise, moving idler sheave and tensioning arm toward front of tractor. Hold

while installing belt on drive sheave.

- On 42-inch mower deck: Make sure belt is routed through both belt guides (I).

9. Remove wood blocks from both sides of mower deck.
10. On machines with 42-inch mower deck: Attach mower engagement drive cable.

a. 

MXML20081202171213 11-UN: 42-inch mower deck only.

Route cable under mower belt and brake rod and attach cable spring (J) to idler sheave bracket (K).

b. Pull out on cable (L), align black end of cable with slot in bracket (M) and release cable into slot. Secure with spring locking pin (N).

11. Level mower.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Primary Drive Belt Removal and Installation

Primary Drive Belt Removal and Installation

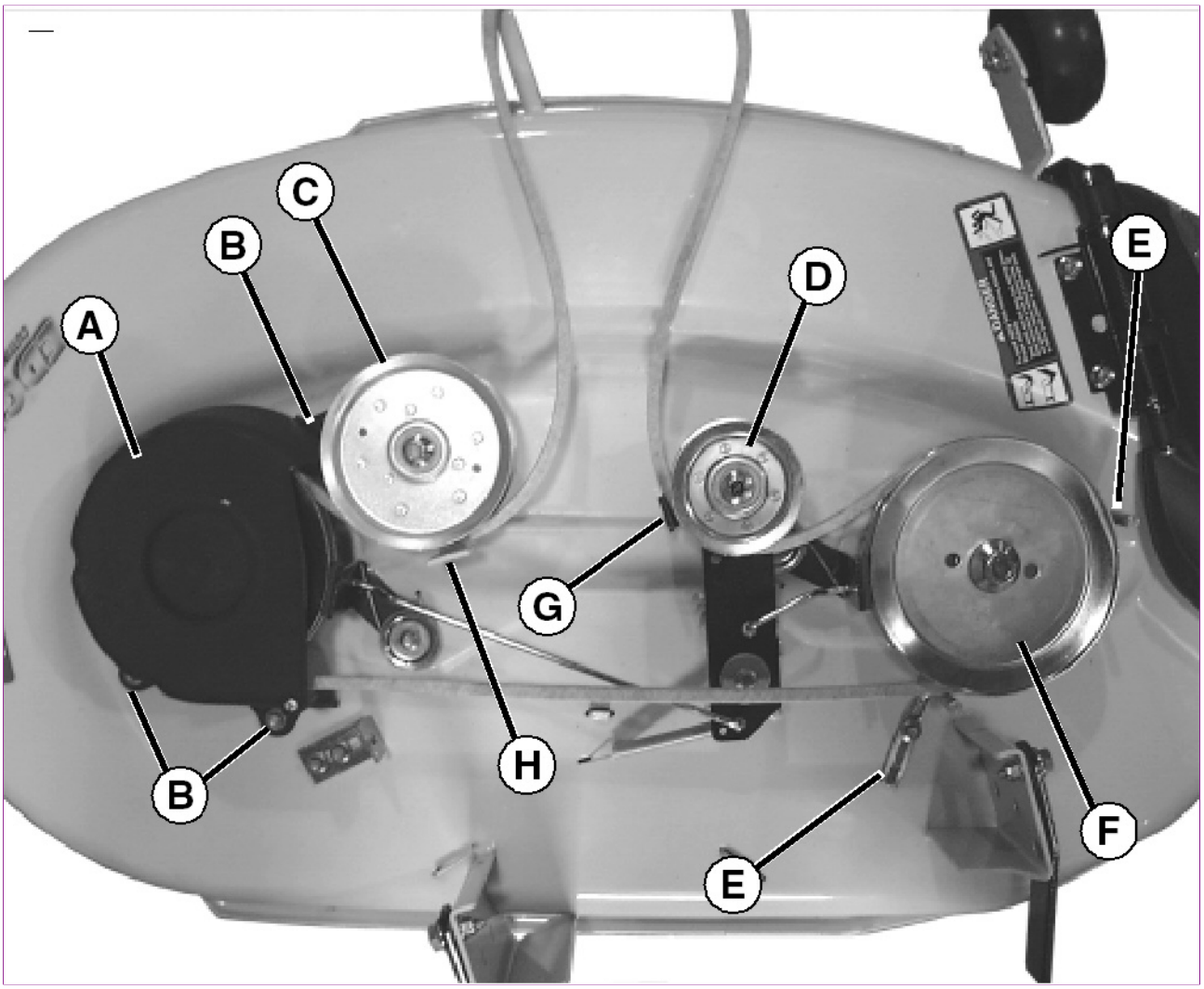
CAUTION:

Rotating blades are dangerous. Before adjusting or servicing mower:

- ***Disconnect spark plug wire(s) to prevent engine from starting accidently.***
- ***Always wear gloves when handling mower blades or working near blades.***

42-Inch Deck

Removal:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Remove mower deck. See Removing Mower Deck .
3. 

Remove three screws (B) and belt cover (A).
4. If necessary, loosen nut on fixed idler sheave (C). Clear belt around belt guide (H).
5. Loosen nut on tensioning idler sheave (D), and clear belt around belt guide (G).
6. Loosen screws for belt guides (E) and move belt guides to clear belt from right sheave (F).
7. Remove belt, inspect for wear or damage, and replace as necessary.

Installation:

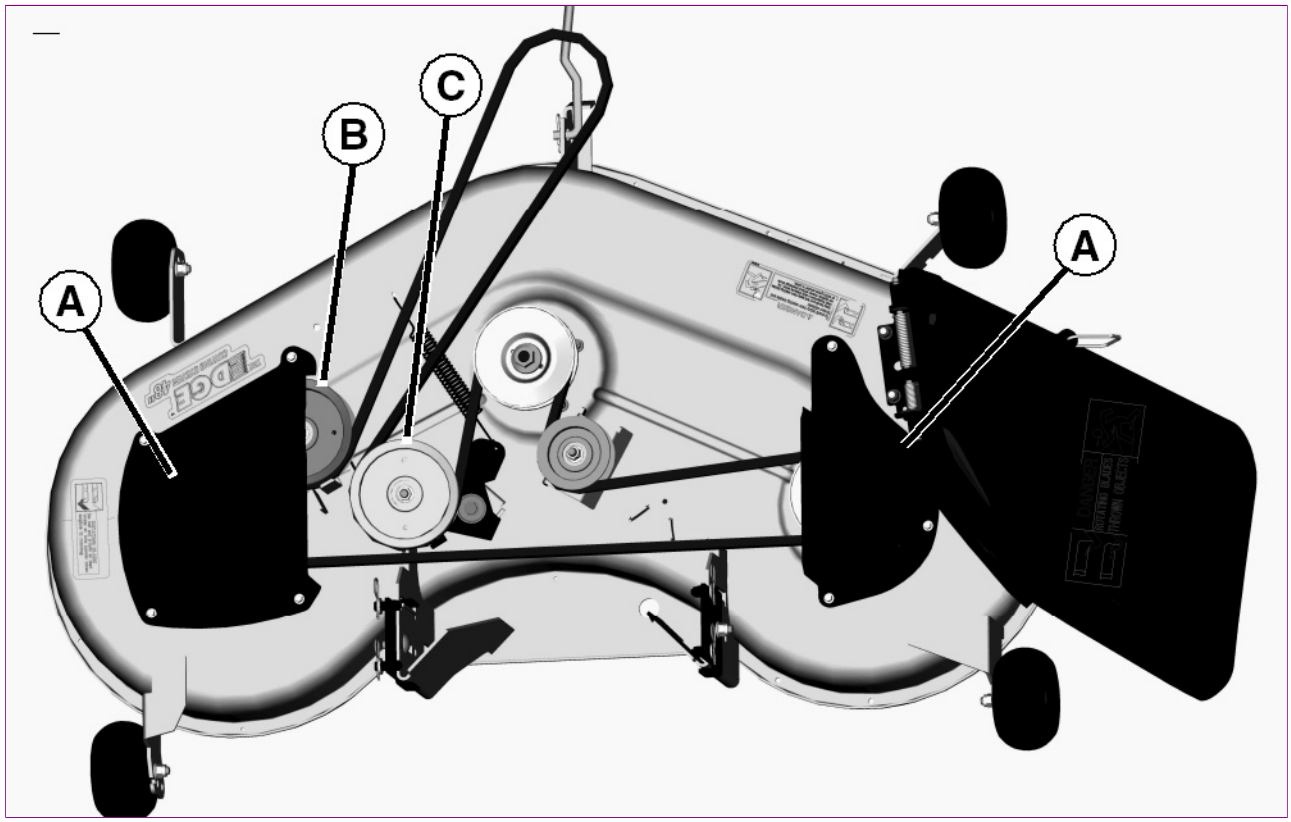
1. Clean top surface of mower deck and sheaves.
2. Route belt around sheaves and belt guides (H and G) (as shown above) and, if loosened, tighten nuts securing idler sheaves (C and D) to specification.
3. Guide belt around the inside of belt guides (E), and tighten belt guide screws.

4. Replace belt cover (A) and secure with three cap screws (B).
5. Install mower deck on machine. See Installing Mower Deck .
6. Adjust mower belt tension. See Mower Drive Belt Tension Adjustment - 42-Inch .
7. Adjust spindle brake. See Blade Brake Adjustment - 42-Inch .

Item	Measurement	Specification
Specification:		
Idler Sheave Nuts		47 N•m 35 lb-ft)

48-Inch and 54-Inch Decks

Removal:

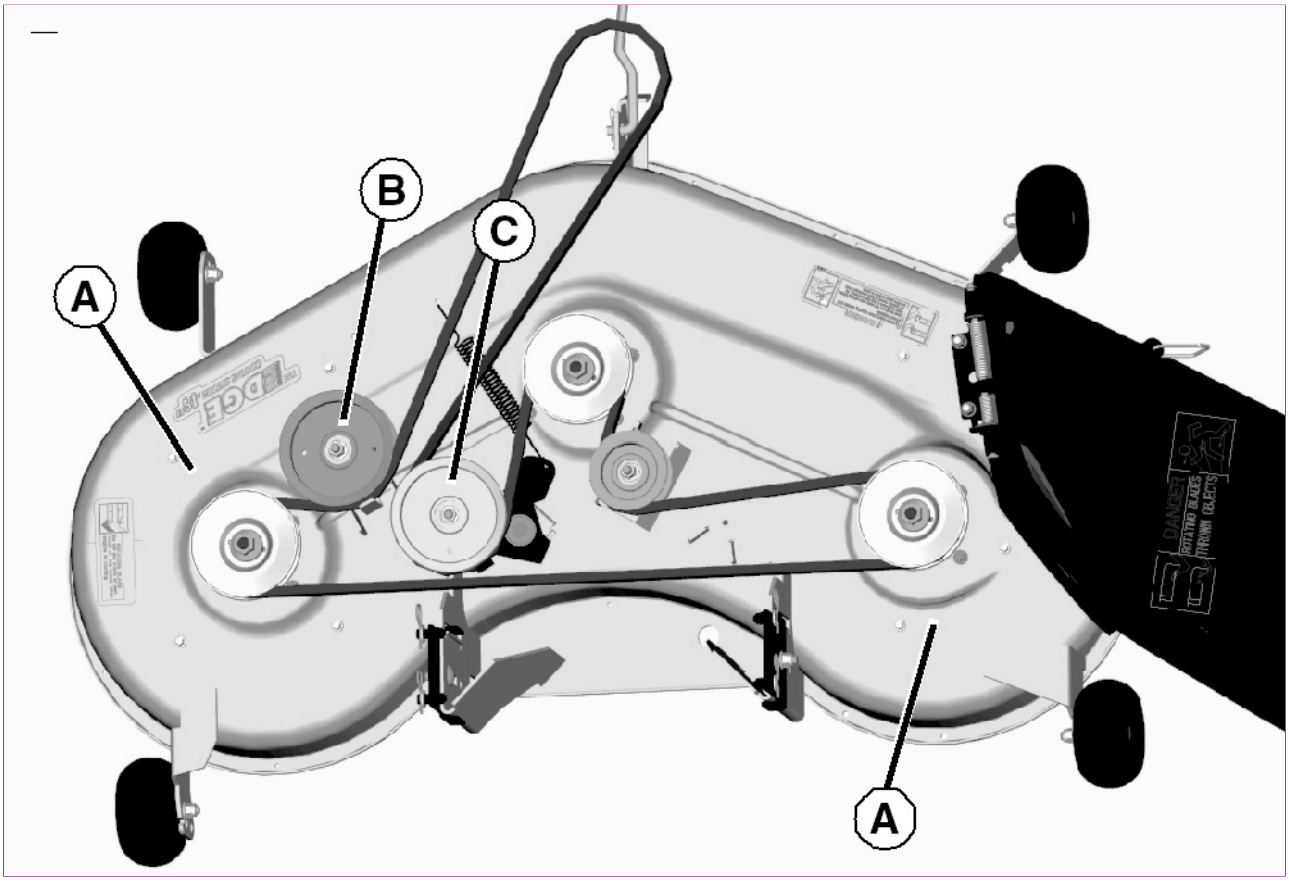
1. Park machine safely. Stop engine and lock parking brake.
2. Remove mower deck. See Removing Mower Deck .
3. 

MXML2008120217121313-UN: 48-Inch deck shown

   Remove cap screws and left and right belt shields (A).
4. Loosen idler sheaves (B and C).
5. Remove belt, inspect for wear or damage, and replace as necessary.

Installation:

1. Clean top surface of mower deck and sheaves.



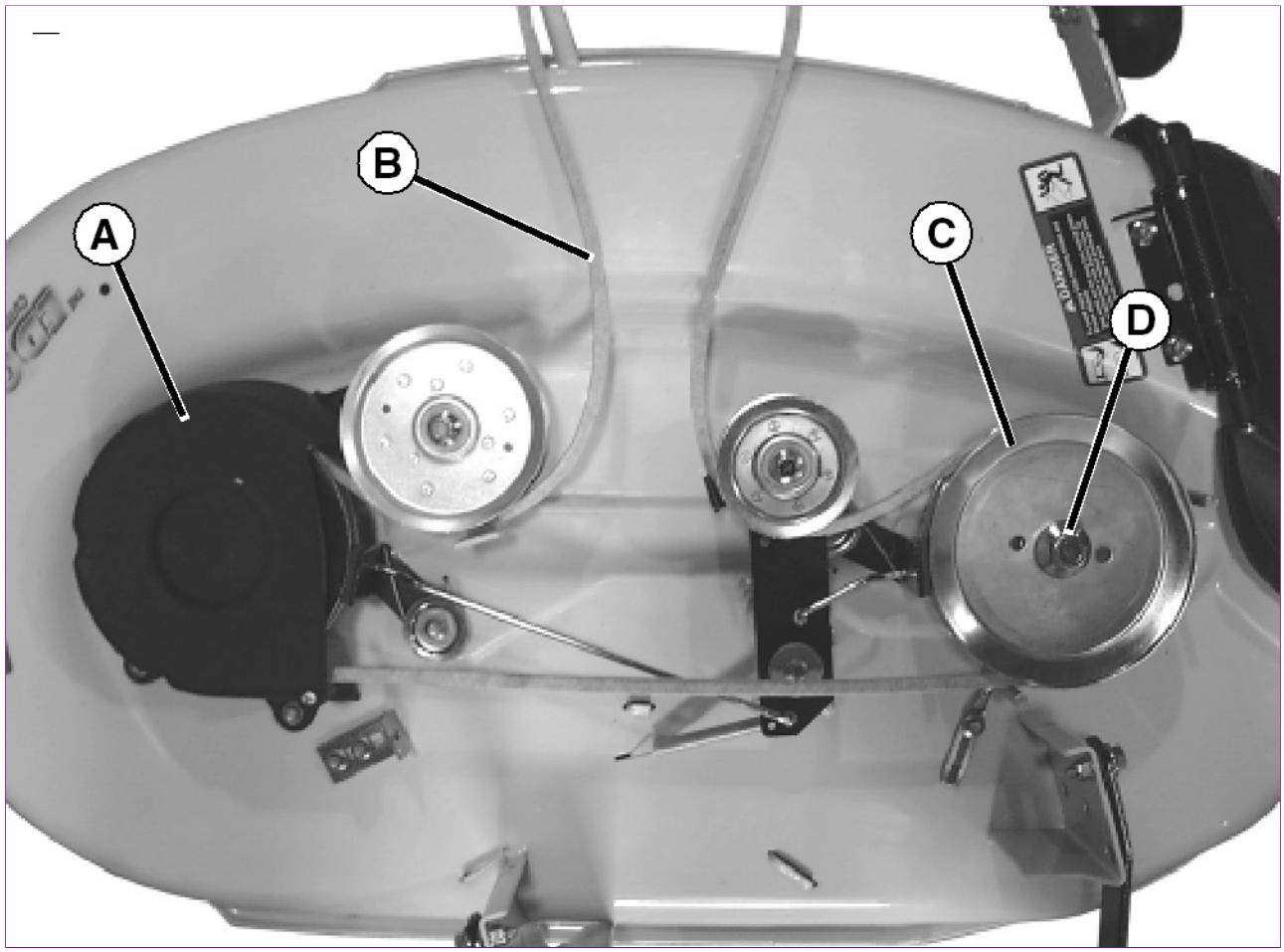
2. Route belt around sheaves (as shown above), and tighten idler sheaves (B and C) to specification.
3. Install belt shields (A), and secure with cap screws.
4. Install mower deck on machine. See Installing Mower Deck .

Item	Measurement	Specification
Specification:		
Idler Sheave Nuts		47 N•m 35 lb-ft)

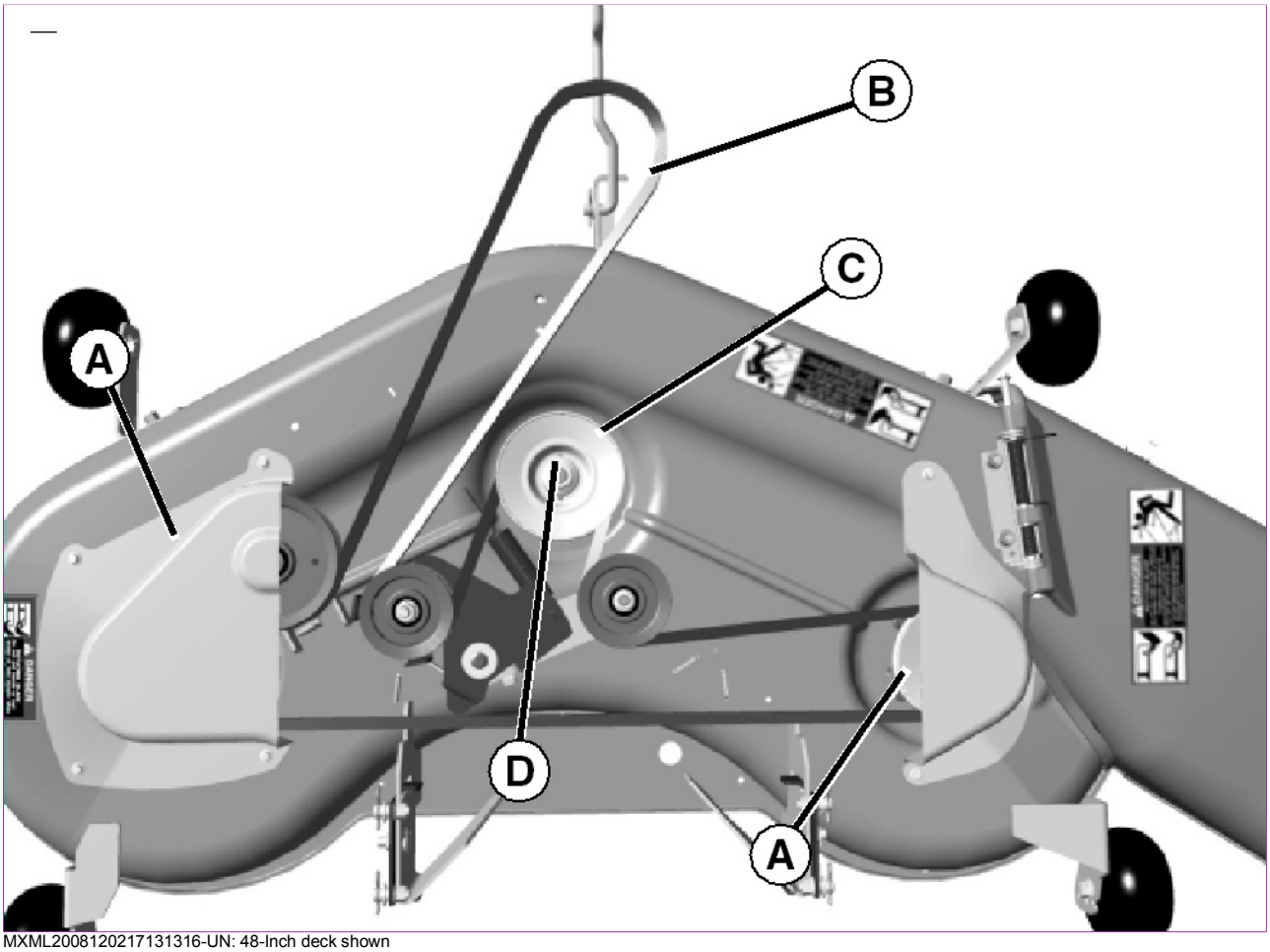
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Spindle Removal and Installation

Spindle Removal and Installation

Removal - 42 and 48-Inch Decks:

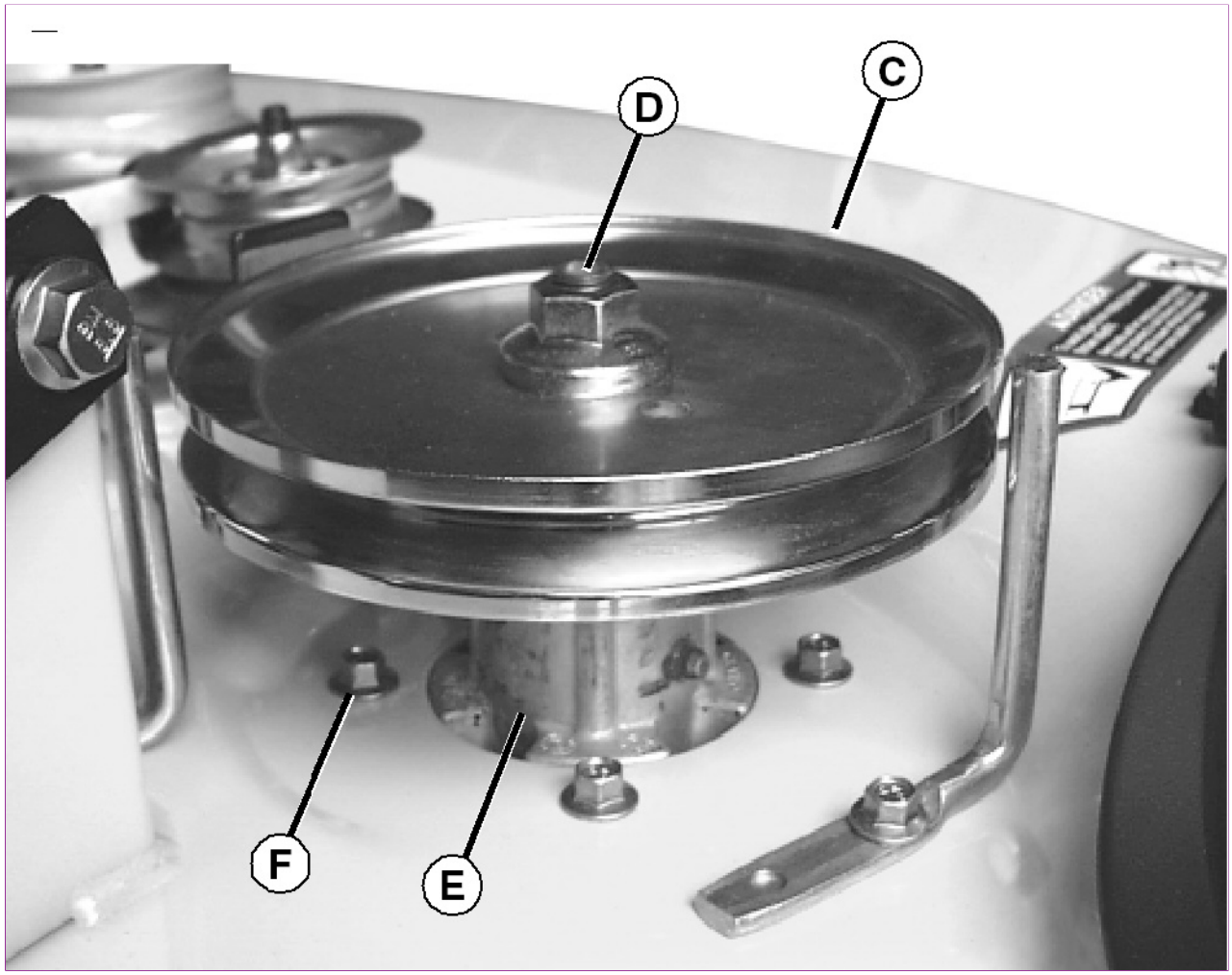
1. Remove mower deck.
2. 

MXML2008120217121315-UN: 42-Inch deck shown



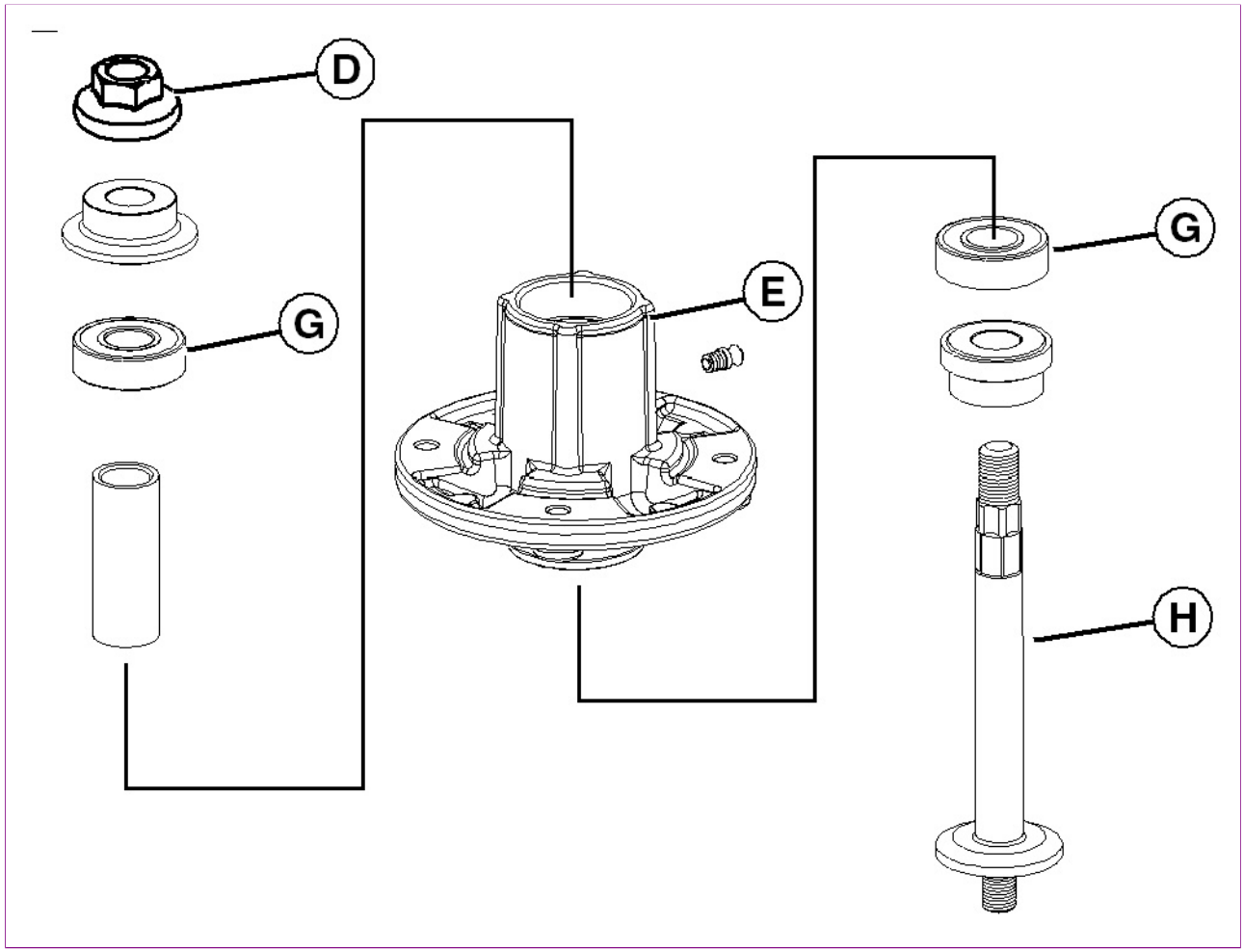
MXML2008120217131316-UN: 48-Inch deck shown

Remove cover(s) (A) and primary drive belt (B). See Primary Drive Belt Removal And Installation .

3. 

MXML2008120217131317-UN: 42-Inch deck shown; 48-Inch similar

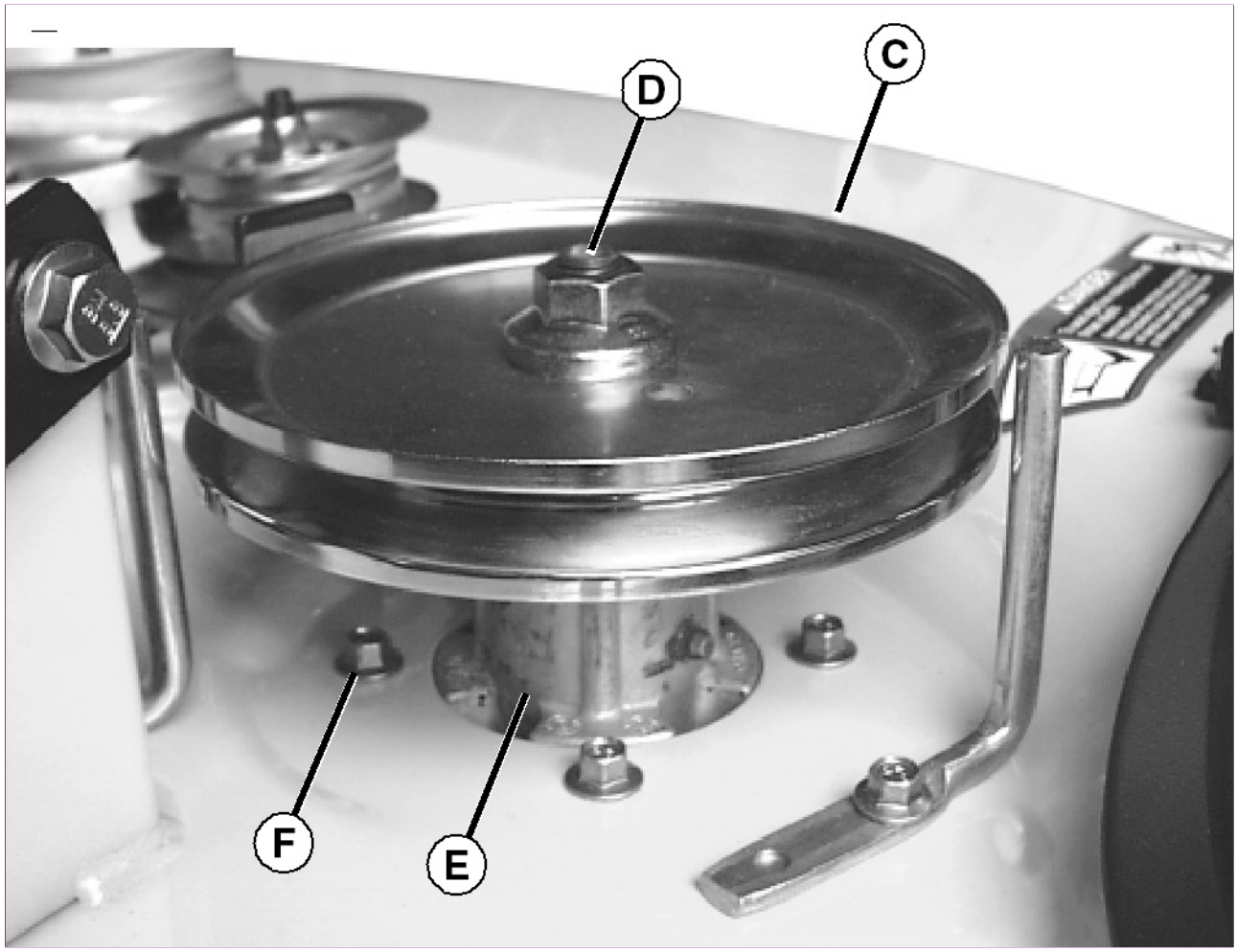
While holding blade (with a block of wood) for the spindle being repaired, remove nut (D) and spindle sheave (C).
4. Remove blade. See Mower Blade Removal and Installation .
5. Remove four cap screws (F). Remove spindle housing (E) from deck.



6. When spindle assembly is removed, place spindle nut (D) back onto end of spindle. Tap lightly with a rubber mallet, releasing spindle from spindle housing.
7. Remove spacers and bearings (G) from spindle housing.

Installation - 42 and 48-Inch Decks:

1. Align inside diameter of all components, and install spindle shaft (H) into spindle housing (E).

2. 

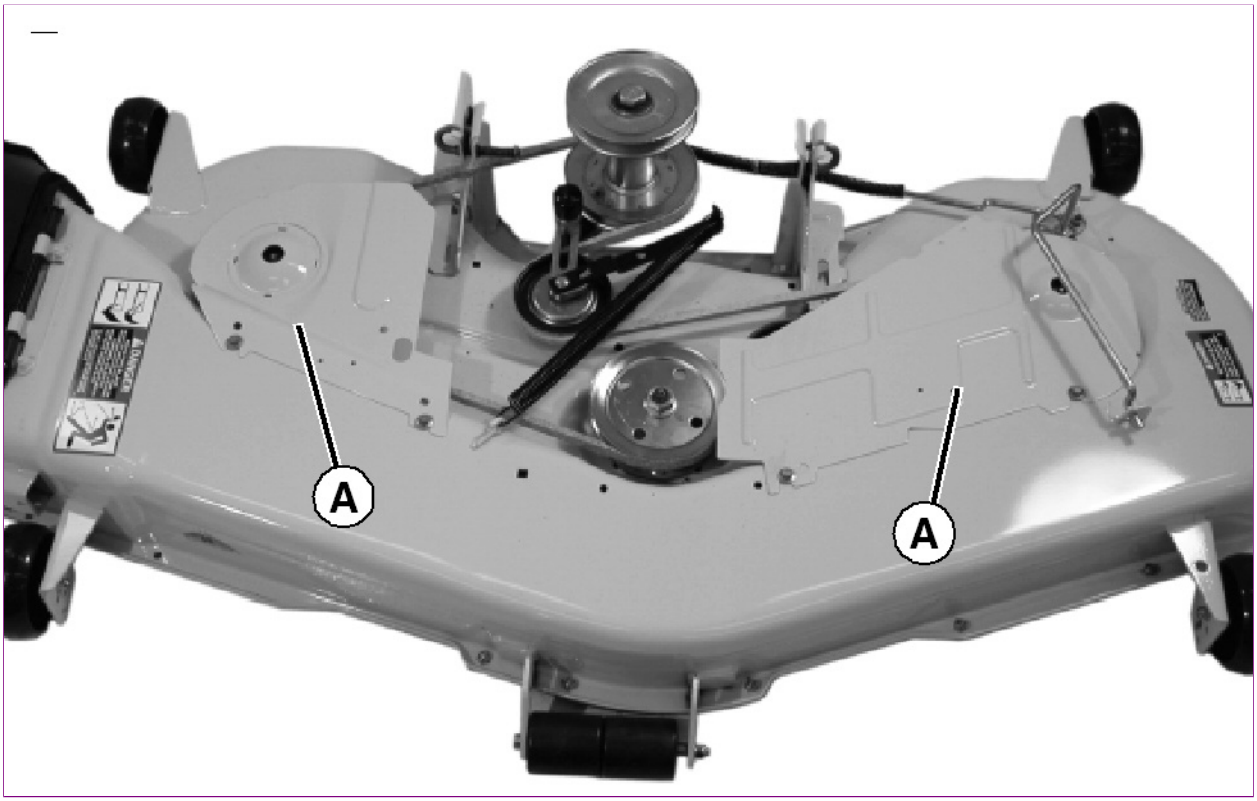
MXML2008120217131319-UN: 42-Inch deck shown

   Position spindle housing (E) into deck from the bottom, attach with four screws (F). Tighten screws to **27 N•m (20 lb-ft)** .
3. Install blade. See Mower Blade Removal and Installation .
4. Place spindle sheave (C) onto end of spindle and secure with nut (D). While holding blade nut, tighten spindle nut to specification.
5. Loosen blade nut and retighten to specification.

Item	Measurement	Specification
Torque Specifications:		
Spindle Sheave Nut		108 N•m 80 lb-ft)
Blade Nut Torque (with M12 Nut)		75 N•m 55 lb-ft)
Blade Nut Torque (with 5/8 in. Nut)		88 N•m 65 lb-ft)
Spindle Mounting Cap Screw		24 N•m 216 lb-in.)

Removal and Installation 54-Inch Deck:

1. Remove mower deck.
2. Remove mower blades. See Mower Blade Removal and Installation .

3. 

   Remove six cap screws (three per shield), and belt shields (A).
4. Remove mower belt.
5. Make repairs as necessary. (See Disassembly/Inspection procedure.)
6. Installation is done in the reverse order of removal. Tighten nuts securing spindles to deck to 24 N•m (18 lb-ft).

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175 Spindle Disassembly and Assembly - 54-Inch Deck

Spindle Disassembly and Assembly - 54-Inch Deck

Disassembly:

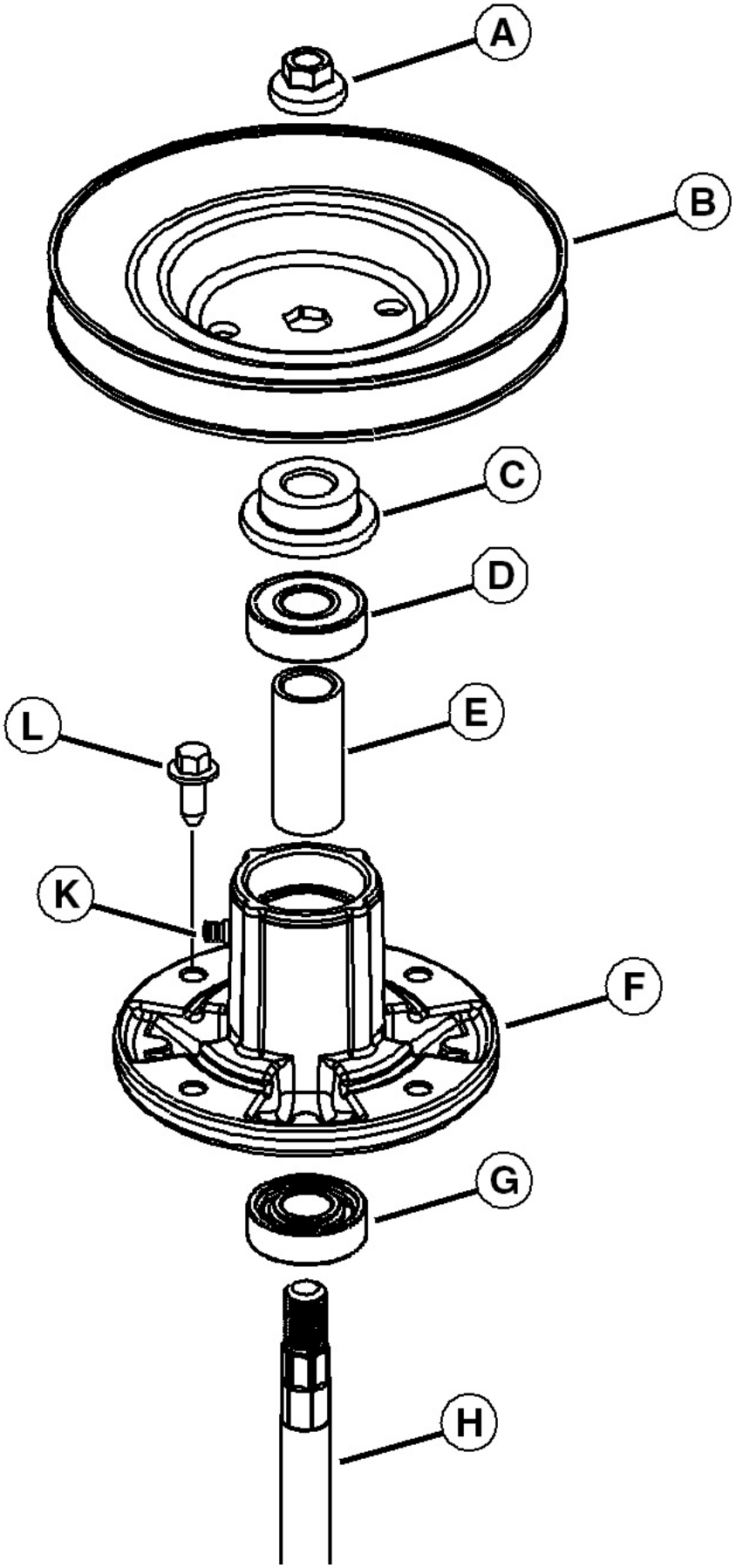
CAUTION:

Mower blades are sharp. Always wear gloves when handling mower blades or working near blades.

IMPORTANT:

Do not install hexagon end of spindle shaft in a vise to remove spindle sheave nut. The hexagon end of the spindle shaft will be damaged resulting in improper blade operation.

1. If only the spindle sheave nut (A) and spindle sheave (B) need to be replaced, and the spindle is still in the deck, use a block of wood to prevent the blade from turning. Tighten blade nut to 108 N•m (80 lb-ft). Remove spindle nut and sheave.


A
B
C
D
E
L
K
F
G
H

If only the nut or spindle sheave need to be replaced, and the spindle has been removed from the deck, install blade, washer (I), and nut (J) on spindle shaft. Clamp blade in a soft-jaw vise. Tighten nut (J) to 108 N•m (80 lb-ft).

3. Hold the blade with a vise and remove spindle sheave nut (A), spindle sheave (B), and lubrication fitting (K).
4. Remove nut (J), washer (I), and blade.
5. Pull spindle shaft (H) out of spindle hub (F).
6. Remove seal ring (C).
7. *NOTE:*

   Remove bearings only if replacement is necessary.

   Bearings (D and G) are seated against spindle hub shoulder and cannot be removed with a press. Remove bearings using a punch.
8. Remove spacer (E).
9. Inspect all parts for wear or damage. Replace parts as necessary.

Assembly:

Installation is done in the reverse order of removal.

- Position spindle housing (F) into deck from the bottom, attach with four screws (L). Tighten screws to **27 N•m (20 lb-ft)** .
- Install blade. Tighten nut (J) to 108 N•m (80 lb-ft).
- Place spindle sheave (B) onto end of spindle and secure with nut (A). While holding blade nut, tighten spindle nut to specification.
- Loosen blade nut and retighten to specification below.

Item	Measurement	Specification
Torque Specifications:		
Blade Nut Torque (with M12 Nut)		75 N•m 55 lb-ft)
Blade Nut Torque (with 5/8 in. Nut)		88 N•m 65 lb-ft)
Spindle Sheave Nut		142 N•m 105 lb-ft)
Spindle Mounting Cap Screw		24 N•m 216 lb-in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Mower Deck Lift Linkage Removal and Installation

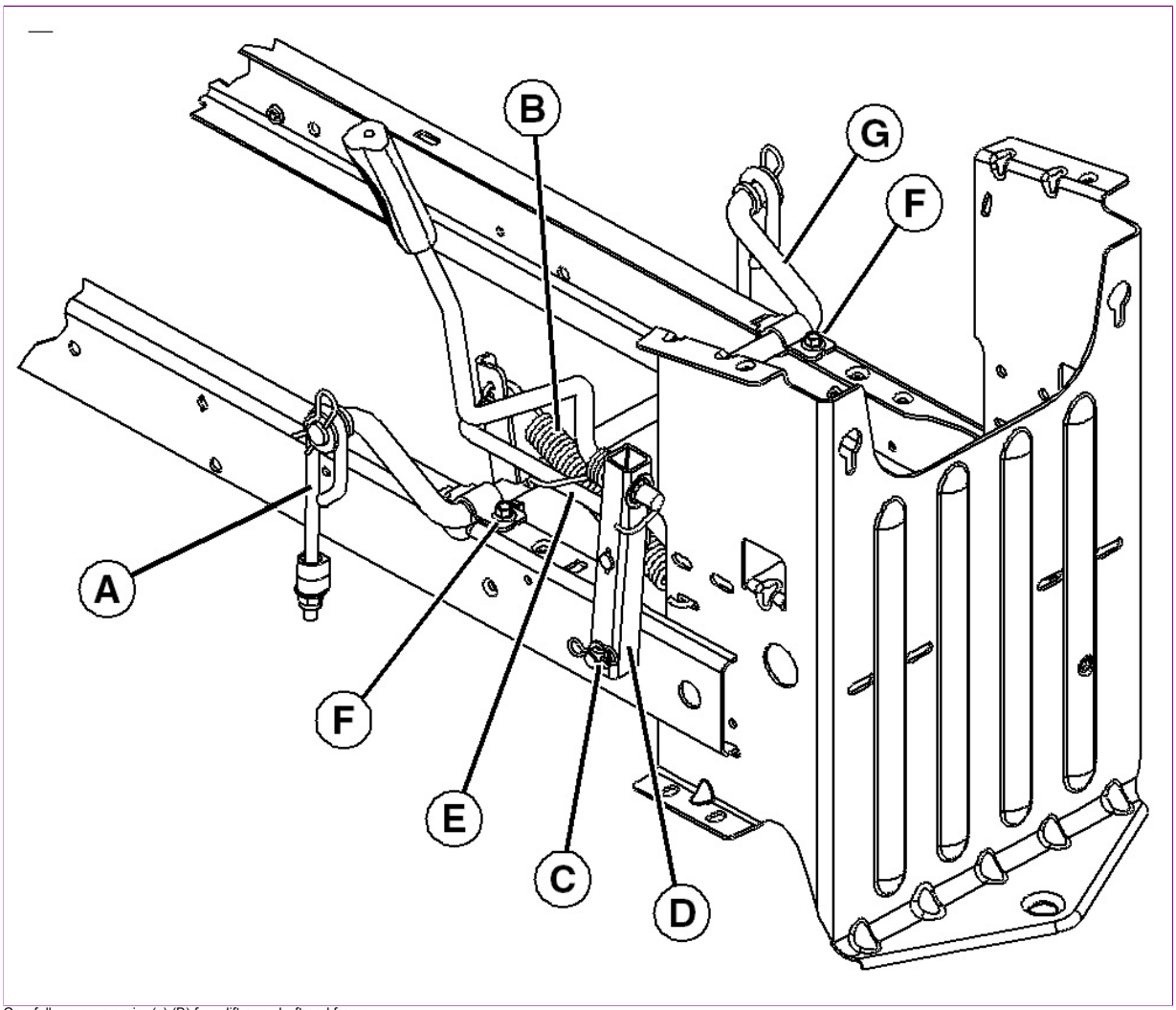
Mower Deck Lift Linkage Removal and Installation

Removal:

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Remove mower deck. See Removing Mower Deck . Remove J-hooks (A).
3. Place deck lift lever in highest position.
4.

CAUTION:

Springs are under tension. Wear gloves and eye protection.



Carefully remove spring(s) (B) from lift arm shaft and frame.
5. Remove spring pin (C) and washer, and remove lift arm lever bracket (D) from stud on machine frame and rod (E).
6. Remove screws (F) and brackets, and remove lift arm shaft (G) from machine frame.
7. Inspect parts for wear or damage. Replace as necessary.

Installation:

1. Install lift arm shaft (G) onto machine frame, and secure with brackets and screws (F).
2. Install lift arm lever bracket (D) onto stud on machine frame and rod (E). Secure with washer and spring pin (C).
3. Install spring(s) (B) onto lift arm shaft and frame.
4. Install J-hooks and mower deck.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Repair Specifications

Repair Specifications

Item	Measurement	Specification
Models LA105 , LA115 and LA155		
Size (Front)		15 x 6.00 - 6
Size (Rear)		20 x 8.0 - 8
Tire Pressure (Front)		97 kPa 14 psi)
Tire Pressure (Rear)		69 kPa 10 psi)

Item	Measurement	Specification
Model LA125		
Size (Front)		15 x 6.00 - 6
Size (Rear)		20 x 10.00 - 8
Tire Pressure (Front)		97 kPa (14 psi)
Tire Pressure (Rear)		69 kPa (10 psi)

Item	Measurement	Specification
Models LA135 , LA145 and LA165		
Size (Front)		16 x 6.5 - 8
Size (Rear)		22 x 9.5 - 12
Tire Pressure (Front)		83 kPa 12 psi)
Tire Pressure (Rear)		83 kPa 12 psi)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Tire Pressure Adjustment

Tire Pressure Adjustment

CAUTION:

Explosive separation of tire and rim parts is possible when they are serviced incorrectly:

- ***Do not attempt to mount a tire without the proper equipment and experience to perform the job.***
- ***Do not inflate the tires above the recommended pressure.***
- ***Do not weld or heat a wheel and tire assembly. Heat can cause an increase in air pressure resulting in an explosion. Welding can structurally weaken or deform the wheel.***
- ***Do not stand in front or over the tire assembly when inflating. Use a clip-on chuck and extension hose long enough to allow you to stand to one side.***

Procedure:

1. Check tire and rim for damage.
2. Using an air pressure gauge, check air pressure.
3. Add or remove air as needed.

Specifications:

Item	Measurement	Specification
LA105/LA115/LA125 and LA155		
Front Tire Pressure		97 kPa 14 psi)
Rear Tire Pressure		69 kPa 10 psi)

Item	Measurement	Specification
LA135/LA145 and LA165		
Front Tire Pressure		83 kPa 12 psi)
Rear Tire Pressure		83 kPa 12 psi)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Front Wheel Removal and Installation

Front Wheel Removal and Installation

Removal:

1. Park machine safely. See Parking Safely in the Safety section.
2.

CAUTION:

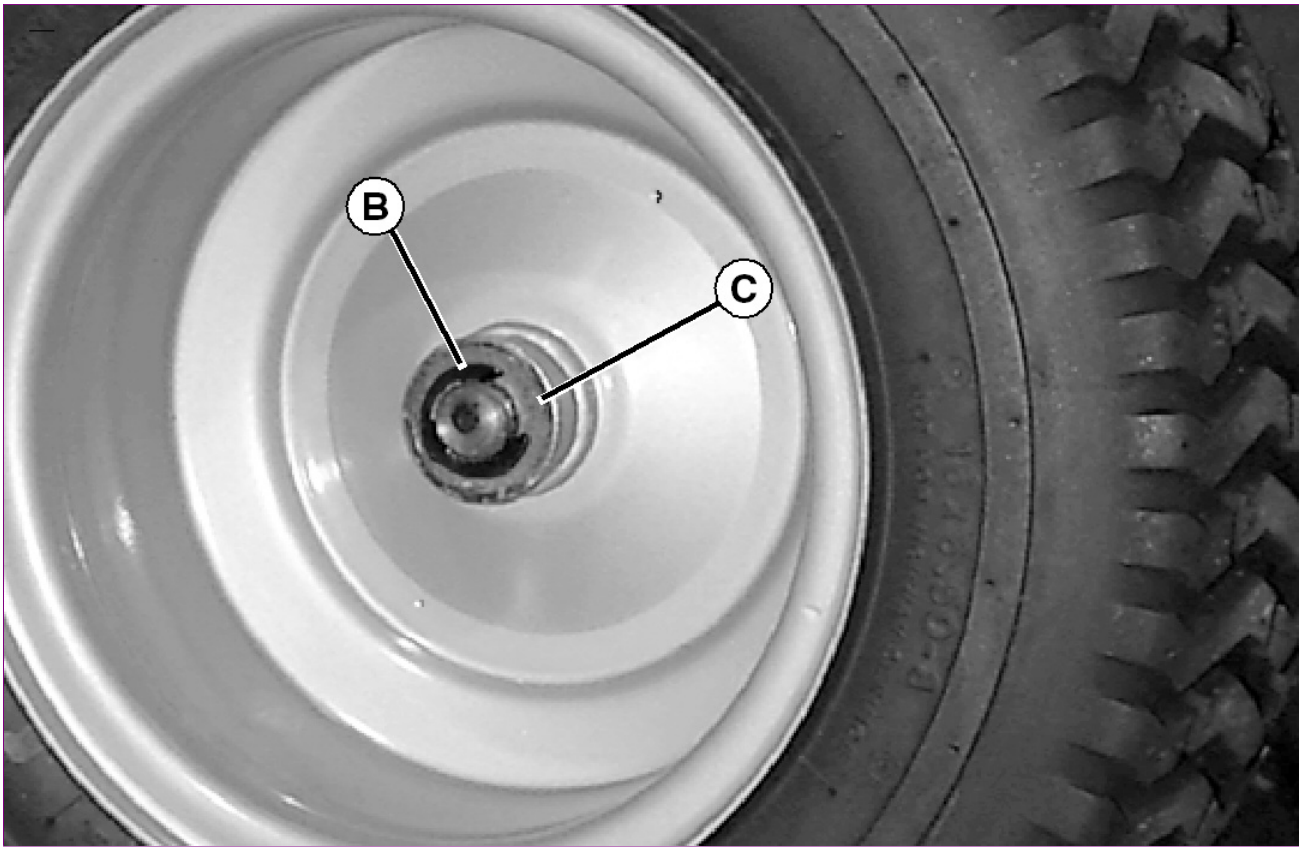
The machine can fall or slip from an unsafe lifting device or supports.

- ***Use a safe lifting device rated for the load to be lifted.***
- ***Lower machine onto jack stands or other stable supports and block wheels before servicing.***

Safely lift and support machine.



3. Remove plastic cap (A) from end of wheel hub.

4. 

   Remove snap ring (B) from end of axle.
5. Remove washer (C), wheel, and shim washers from axle.

Installation:

1. Grease spindles with specified grease.
2. Install new shim washers, wheel, and washer (C) on axle.
3. Install snap ring (B).
4. Install plastic cap.

Front Wheel Bushing Removal and Installation

Procedure:

1. Remove front wheel.



2. Measure ID of bushing (A). If not within specifications, replace bushing.
3. **IMPORTANT:**

   If bushings are loose in wheel hub replace wheel.

   Use a finger puller on a slide hammer to remove bushing from wheel hub.
4. Install new bushings using suitable driver on outside race of bushing.

Item	Measurement	Specification
Specifications:		
Wheel Bushing OD		35 mm 1.378 in.)
Wheel Bushing ID		19.15 0.754 in.)
Axle Diameter		18.97 mm 0.747 in.)

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Rear Wheel Removal and Installation

Rear Wheel Removal and Installation

Removal:

1. Safely lift and support machine.
2. 

Remove plastic cap (A), snap ring (B), and washer (C).
3. Remove wheel.
4. Remove key (D) (shown on end of transaxle shaft), spacer (E) and back washer (F).

Installation:

1. *NOTE:*

   Rear wheels are installed with valves to the outside.

   Install back washer (F), spacer (E), and key (D).
2. Install rear wheel, washer (C), snap ring (B) and plastic cap (A).

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Hood Removal and Installation

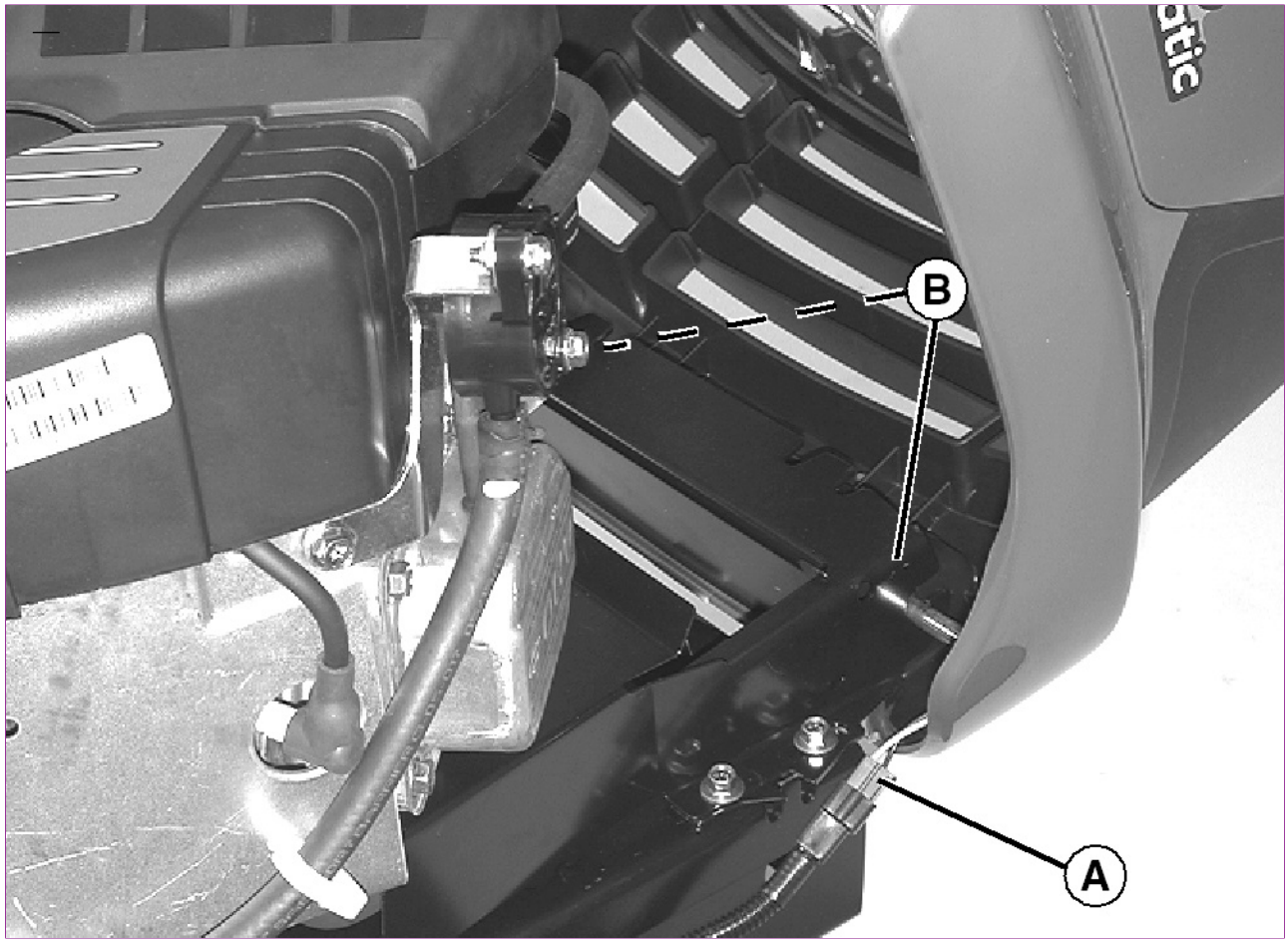
Hood Removal and Installation

Removal:

1. Park machine safely with park brake locked.
2.

CAUTION:

Touching hot surfaces can burn skin. The engine and components will be hot if the engine has been running. Allow the engine to cool before removing hood.

   Let engine cool.
3. Pivot hood to open position.
4. 

   Disconnect wiring harness (A).
5. Lower hood slightly and lift hood from brackets (B).
6. Lift up and forward to remove hood from machine frame.

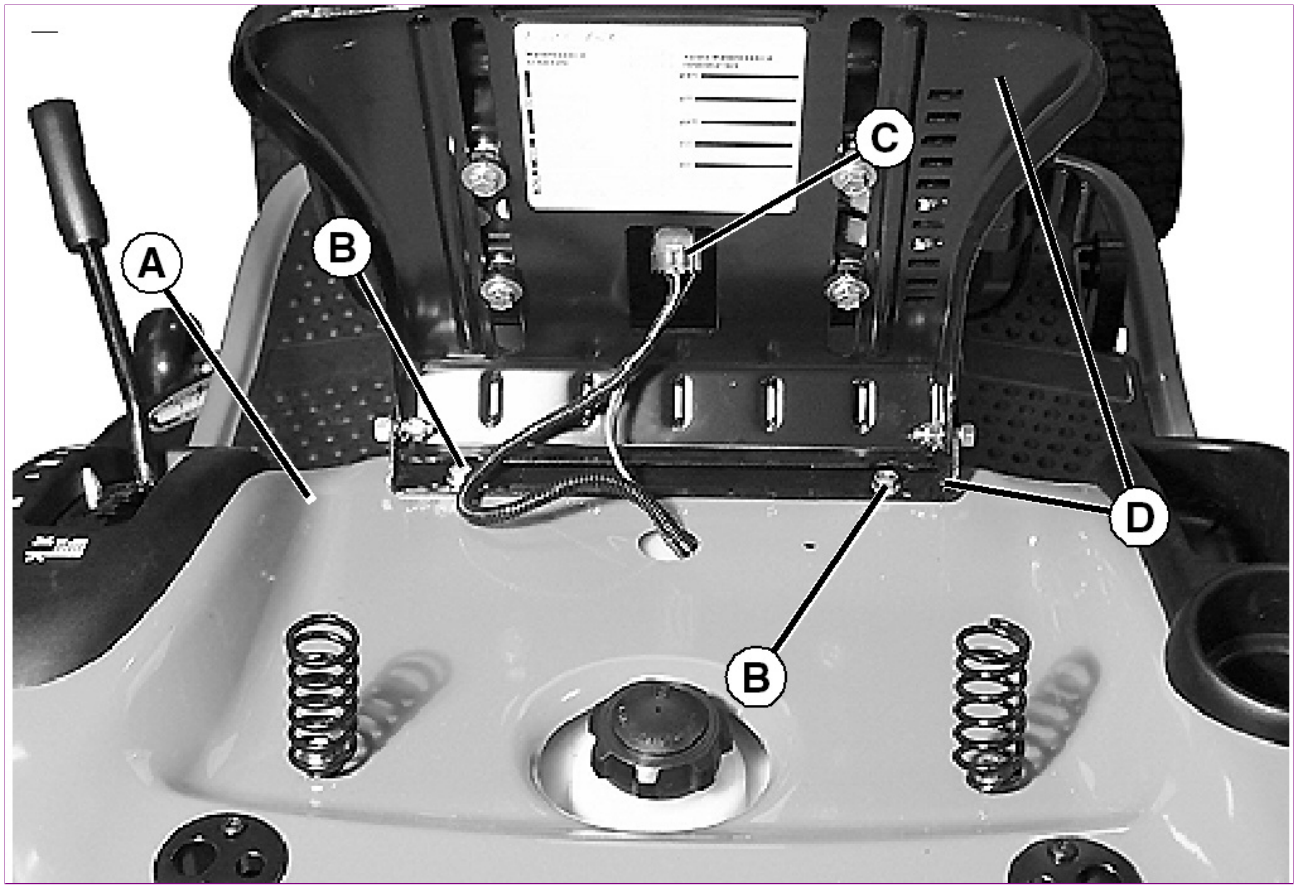
Installation:

1. Bringing hood to frame at approximately a 45 angle, place hood into position, lining up hood pins with slots in hood mounting bracket. Open hood completely to fully seat pins in hood mounting bracket.
2. Connect electrical connector (A) for headlight wiring harness.
3. Close hood.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Seat and Support Removal and Installation

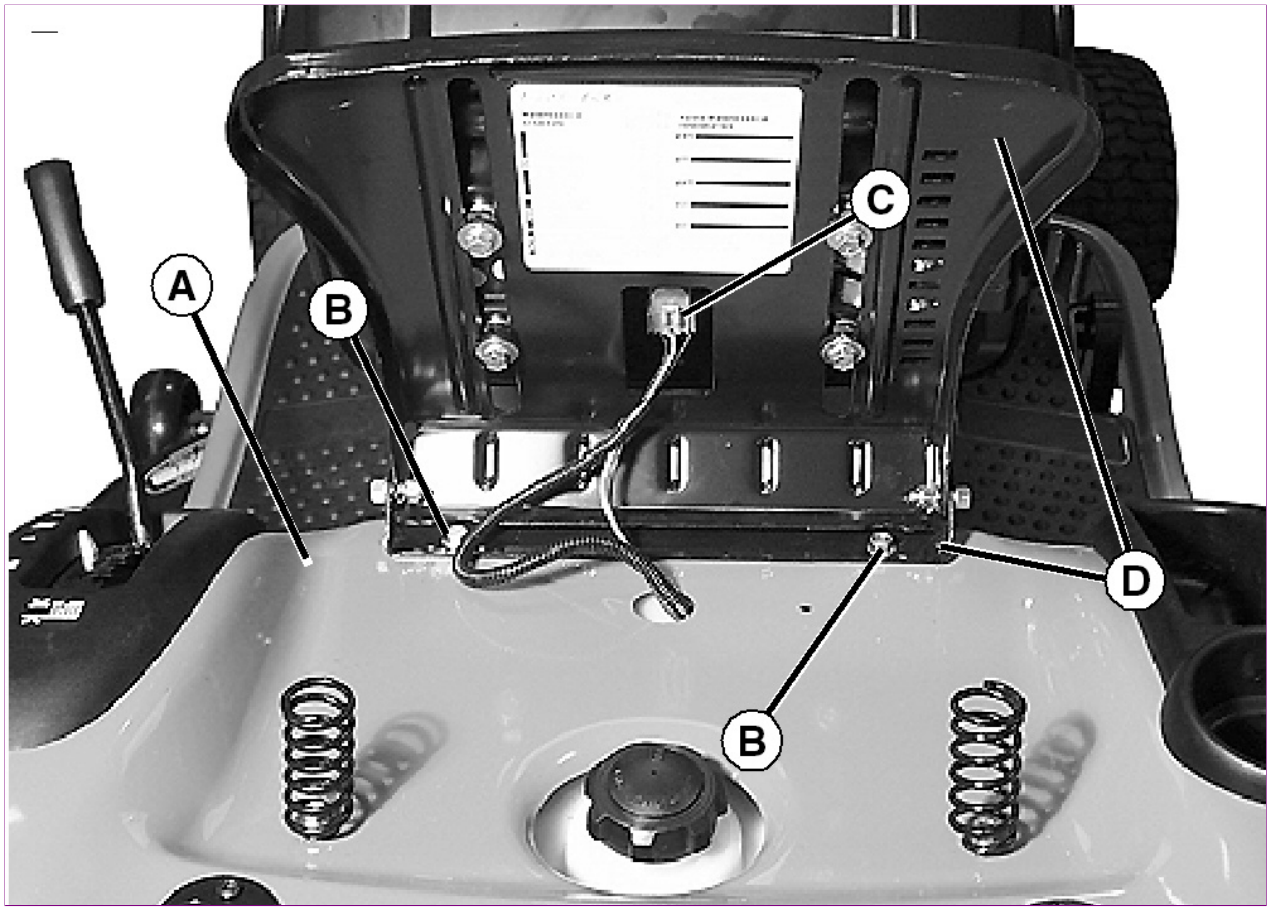
Seat and Support Removal and Installation

Removal:



1. Tilt seat forward and disconnect wiring harness (C) from seat switch.
2. Remove screws (B) holding bracket and seat assembly (D) to fenderdeck (A).
3. Remove seat assembly and inspect for damage. Replace parts as necessary.

Installation:

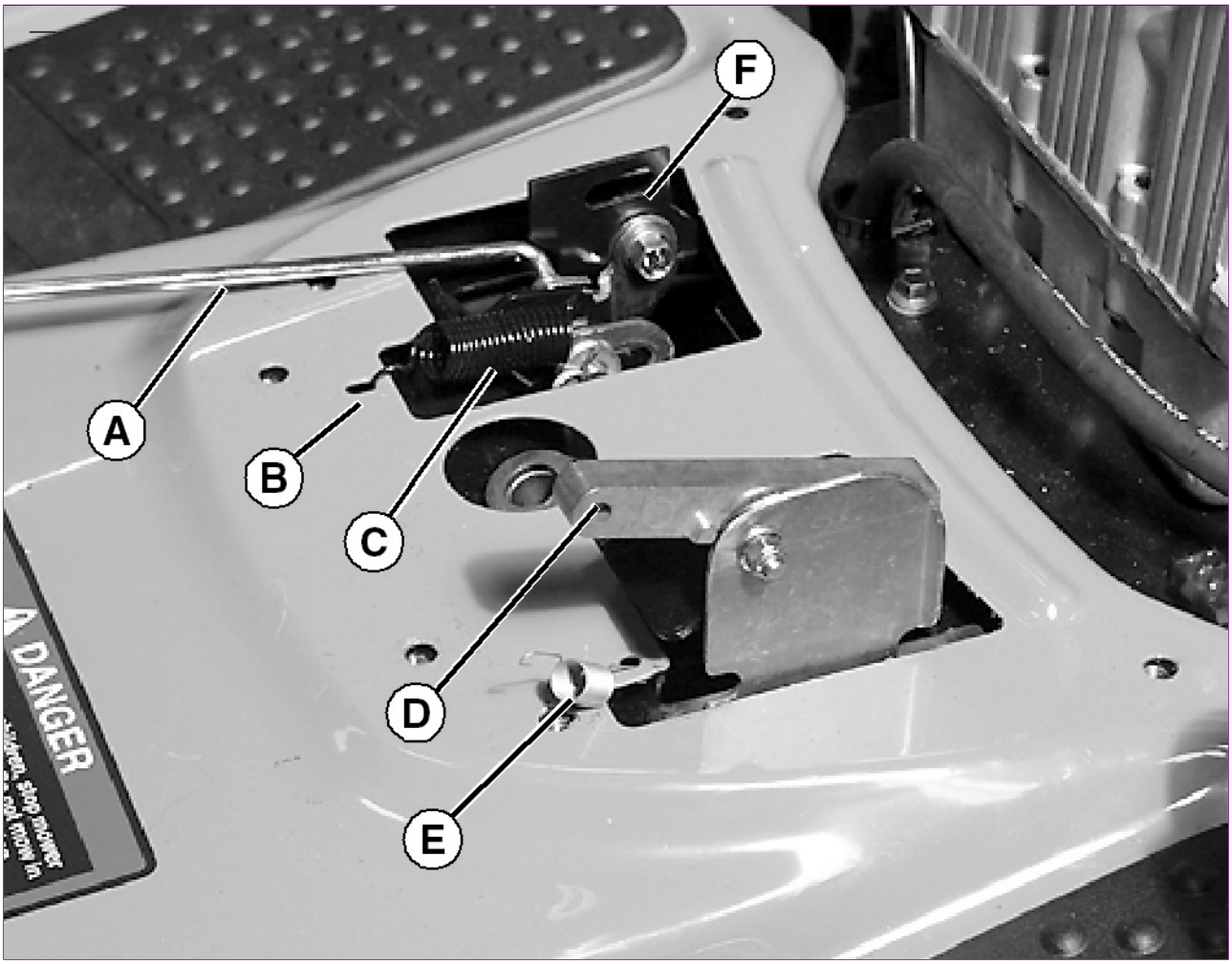


1. Place seat assembly (D) onto fenderdeck (A), and secure with screws (B).
2. Install wiring harness (C) to seat switch.

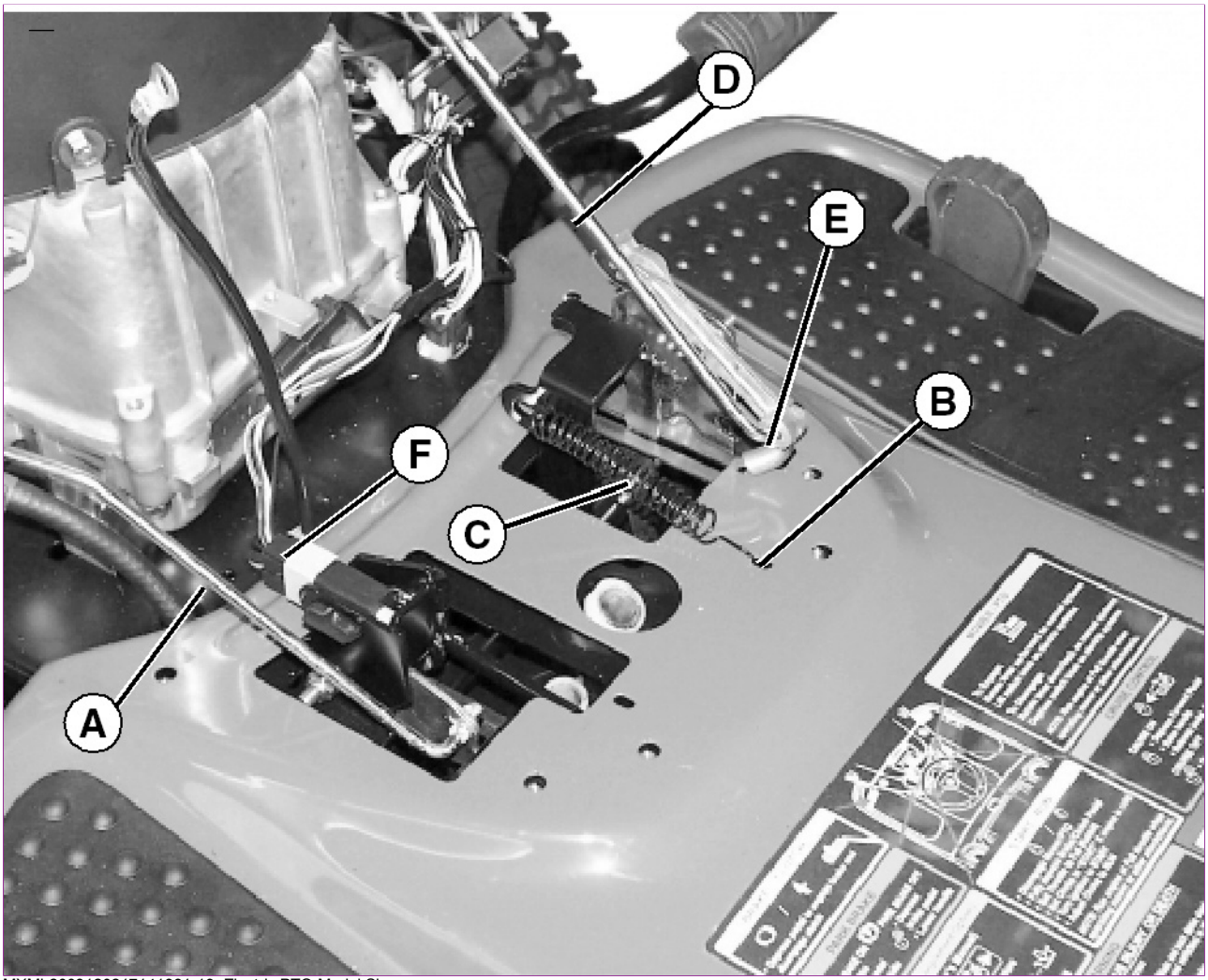
tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Fenderdeck Removal and Installation

Fenderdeck Removal and Installation

Removal:

1. Safely park machine, and raise hood.
2. Remove pedestal. See Steering Shaft and Pedestal Removal and Installation in the Steering section. It is not necessary to remove steering shaft from pedestal assembly.
3. 

MXML2008120217141330-19: Manual PTO model shown



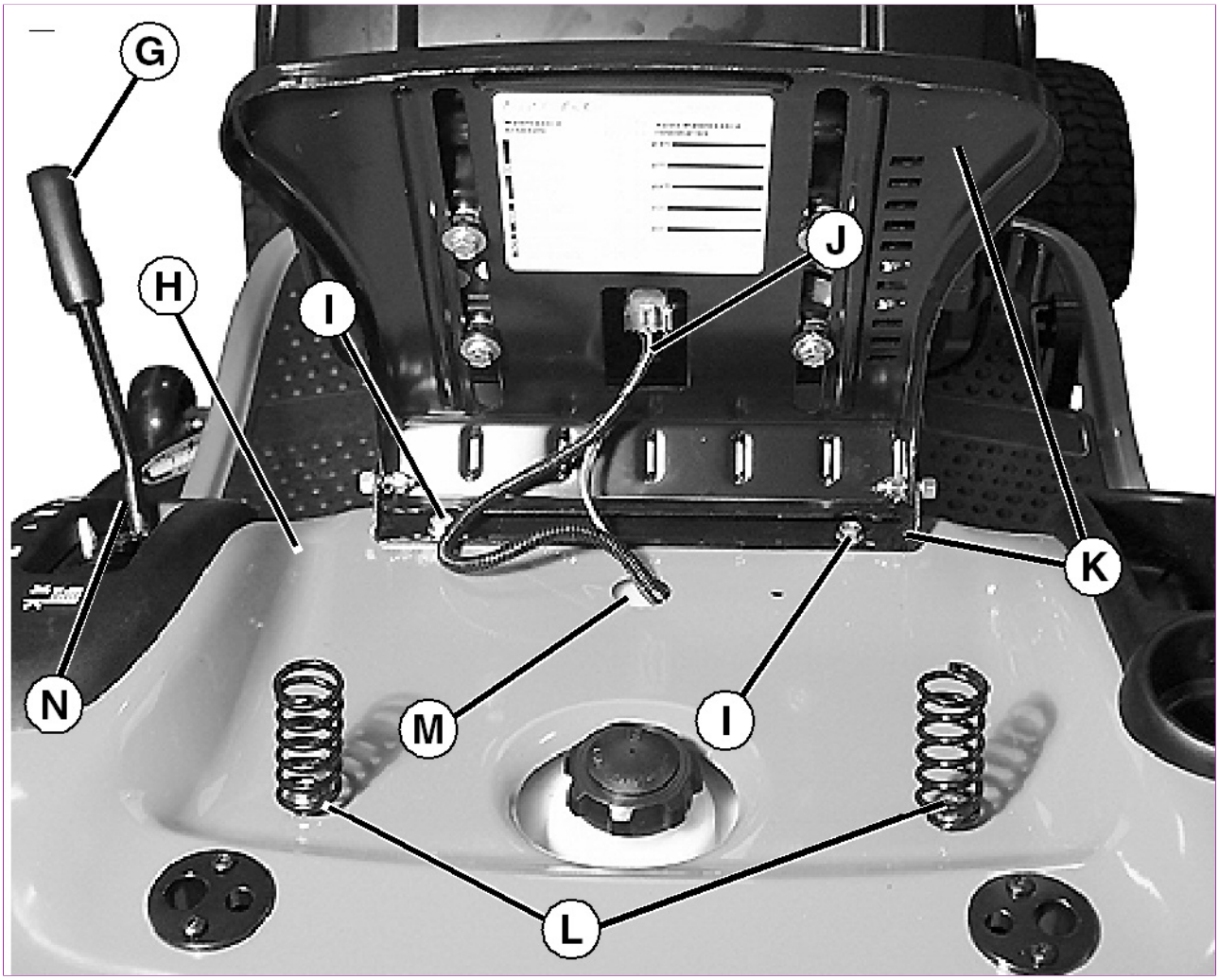
MXML2008120217141331-19: Electric PTO Model Shown

4. Remove spring (C) from hole (B) in fenderdeck. Remove brake rod (A).

NOTE:

Notice direction spring (E) is installed. If installed correctly, spring will not pop out when you move cruise control rod up and down.

Remove spring (E) from fenderdeck. Remove cruise rod (D).

5. 

Tilt seat forward and disconnect wiring harness (J) from seat switch. Guide wiring harness through hole (M) in fenderdeck (H).
6. Remove screws (I) and seat assembly (K) from fenderdeck.
7. Remove rubber grip (G) from deck lift arm.
8.

CAUTION:

Lift arm assembly is spring loaded and can snap back when raising fenderdeck.

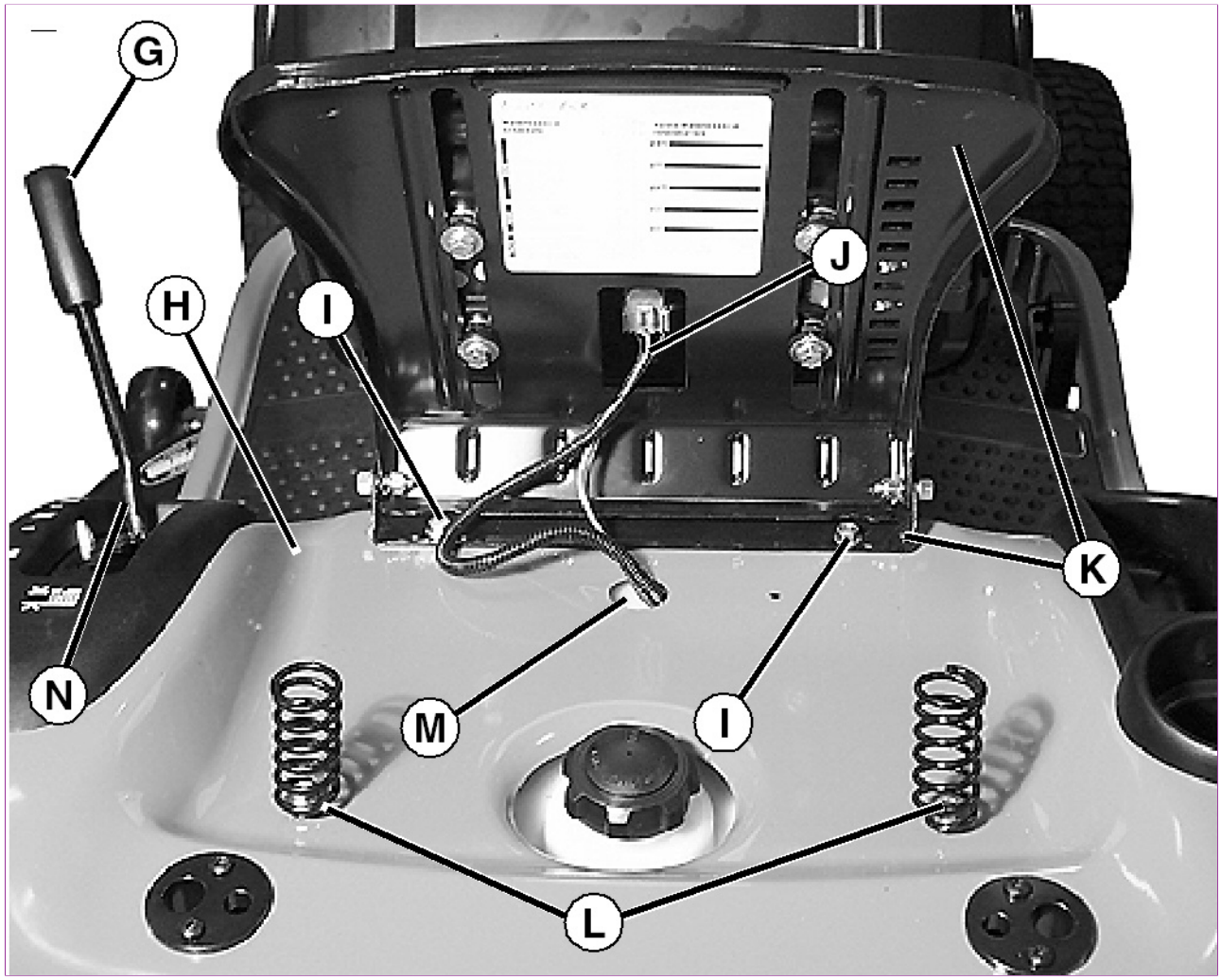
Remove fenderdeck slowly and hold lift arm during removal.

Remove screws (L) holding springs to fenderdeck and fenderdeck to frame.
9. *NOTE:*

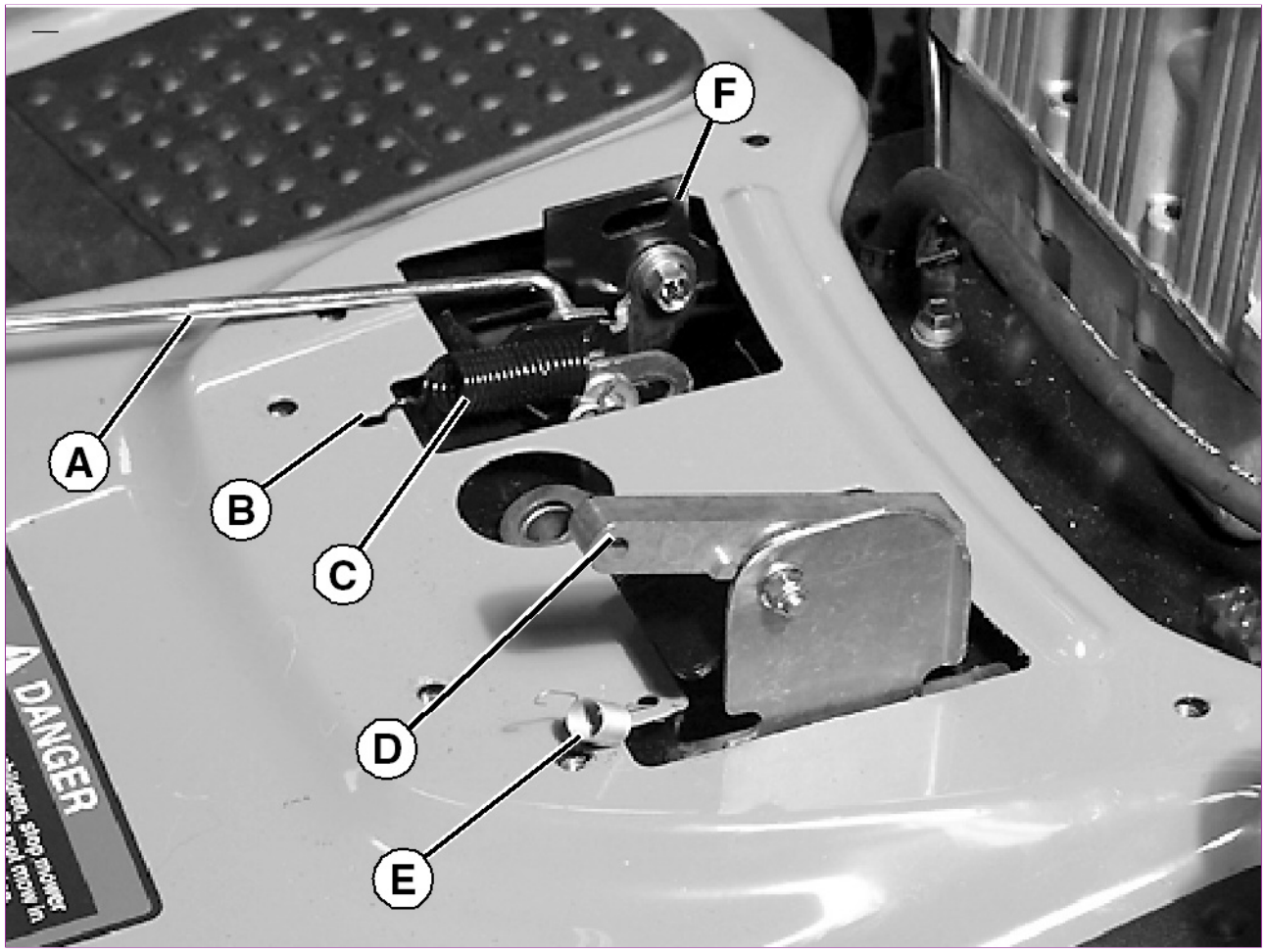
When raising fenderdeck from frame, you may need to raise/lower and turn fenderdeck in several positions for it to clear all brake rod and cruise control brackets and hardware.

Raise and remove fenderdeck from frame.

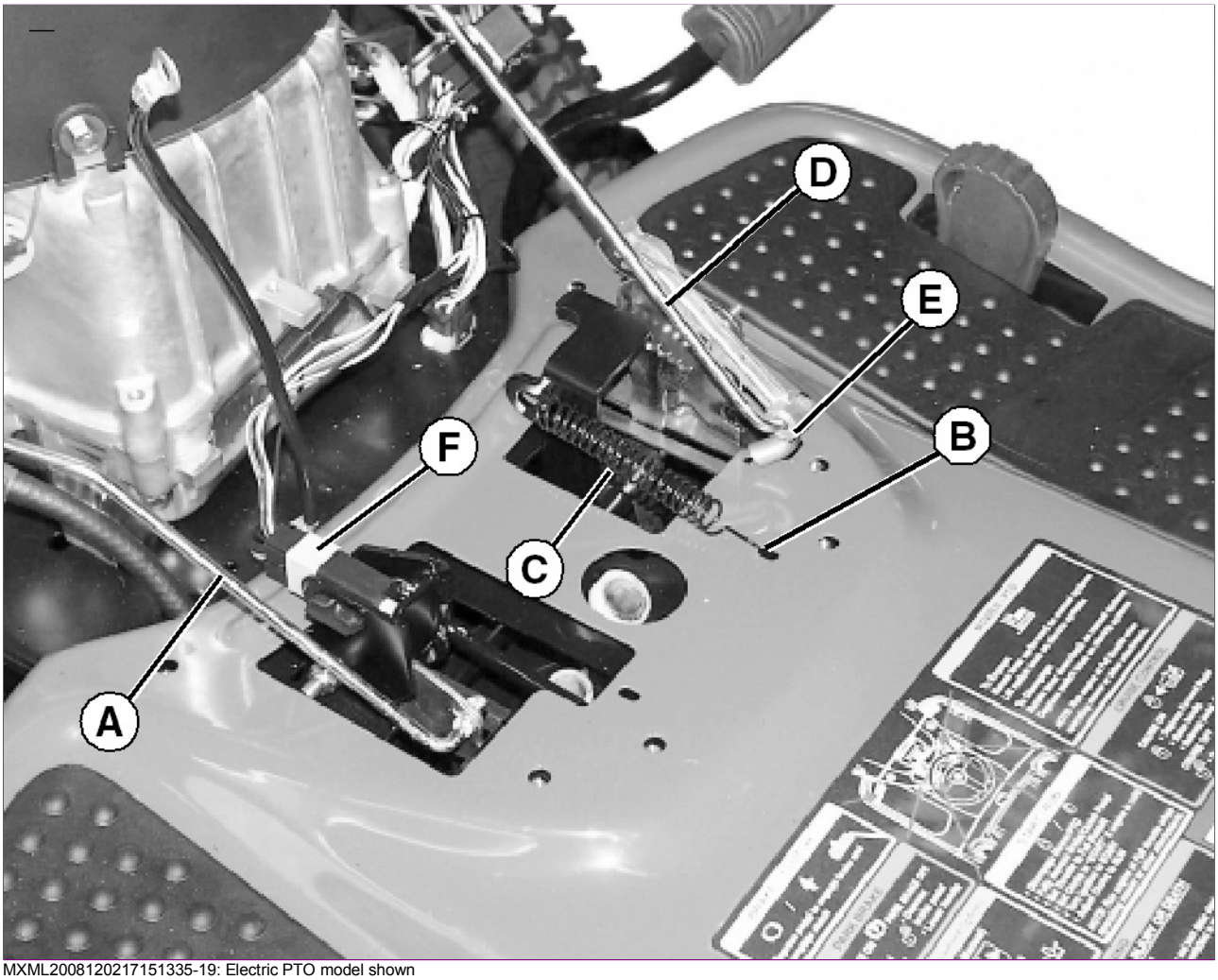
Installation:



1. Place fenderdeck (H) on frame, carefully placing lift arm (N) into slot of fenderdeck and guiding wiring harness (J) through fenderdeck hole (M).
2. Place rubber grip (G) onto lift arm.
3. Secure two springs with screws (L) through fenderdeck onto frame.
4. Place seat assembly (K) onto fenderdeck and secure with two screws (I).
5. Connect wiring harness (I) onto seat switch.

6. 

MXML2008120217151334-UN: Manual PTO model shown



MXML2008120217151335-19: Electric PTO model shown

Install brake rod (A) onto parking brake bracket.

7. Connect spring (C) into hole (B) in fenderdeck and brake arm.
8. Connect electrical connector to brake switch (F).
9. Install cruise rod (D).
10. *NOTE:*

    Install spring (E) in position shown above. If installed correctly as shown, spring will not pop out when you move cruise control rod up and down.

Install steering wheel, shaft, and pedestal. See Steering Shaft and Pedestal Removal and Installation in the Steering section.

tm103419 - John Deere Tractors LA105, LA115, LA125, LA135, LA145, LA155, LA165 and LA175
Fuel Tank Removal and Installation

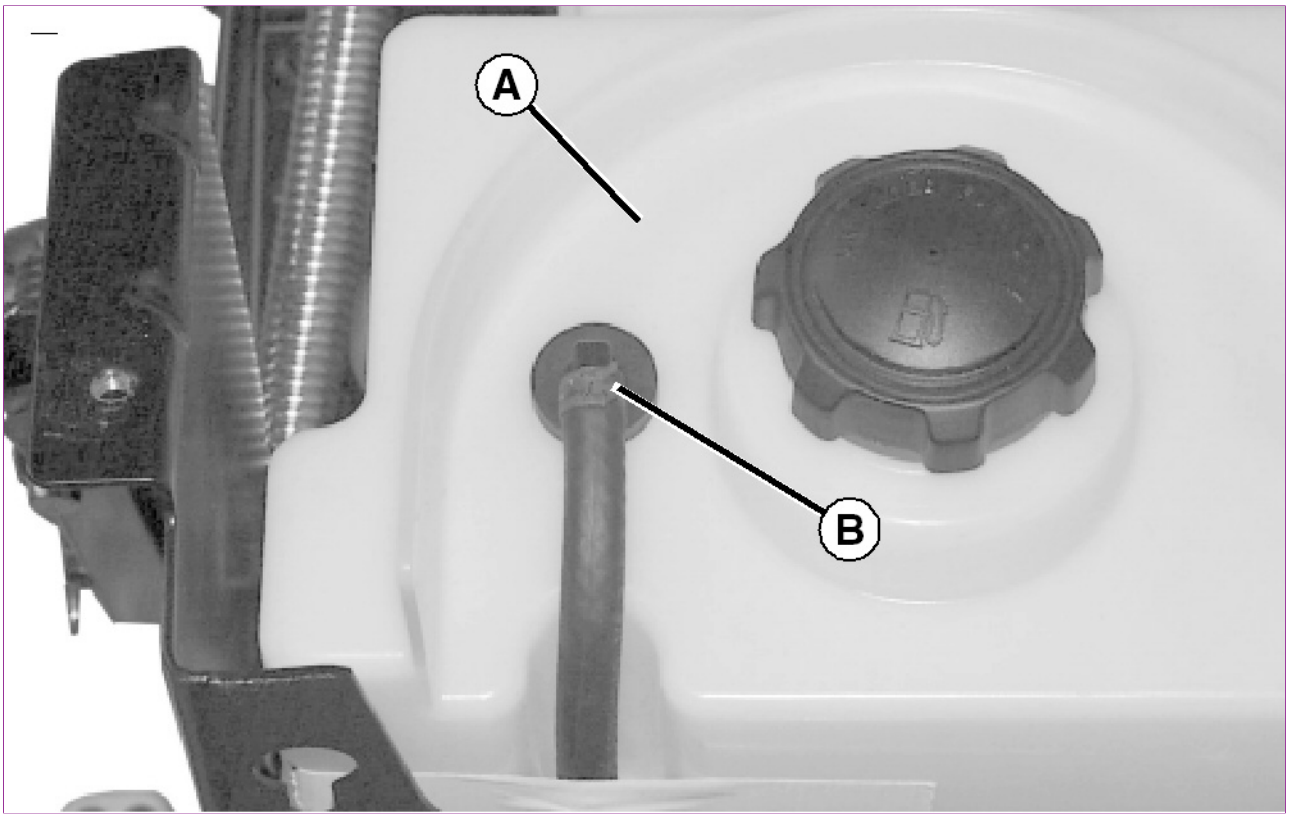
Fuel Tank Removal and Installation

Removal:

CAUTION:

Fuel vapors are explosive and flammable:

- ***Shut engine off and allow to cool before draining and removing fuel tank.***
- ***Do not smoke while handling fuel.***
- ***Drain fuel tank outdoors or in well ventilated area.***
- ***Keep fuel away from flames or sparks.***
- ***Clean up spilled fuel immediately.***

1. Disconnect negative (-) battery cable.
2. Disconnect fuel line at engine fuel pump and drain fuel from tank into an approved fuel storage container.
3. Remove steering shaft and pedestal. See Steering Shaft and Pedestal Removal and Installation in the Steering section.
4. Remove fenderdeck assembly. See Fender Deck Removal and Installation .
5. 

Remove fuel line (B) from fuel tank (A).
6. Raise fuel tank from frame and fuel tank support rod.

Installation:

1. Lower fuel tank onto frame and fuel tank support rod.
2. Connect fuel line (B) to fuel tank (A) fuel outlet.
3. Install fenderdeck assembly. See Fender Deck Removal and Installation .
4. Install steering shaft and pedestal. See Steering Shaft and Pedestal Removal and Installation in the Steering section.
5. Connect fuel line to engine fuel pump, and fill fuel tank.
6. Connect negative (-) battery cable.